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In the

Supreme Court of the United States

OCTOBER TERM, 1970

DEERE & COMPANY,

Petitioner,

vs.

HESSTON CORPORATION, HESSTON OF TEXAS, INCORPORATED, and JOE ED CRAWFORD, d/b/a CRAWFORD EQUIPMENT COMPANY,

Respondents.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT

DUGALD S. McDOUGALL
THEODORE R. SCOTT
135 South LaSalle Street
Chicago, Illinois 60603
Tel.: 346-0338
Attorneys for Petitioner

The Scheffer Press, Inc.—ANdover 3-6850

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PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT

Petitioner prays that a writ of certiorari issue to review the judgment of the United States Court of Appeals for the Fifth Circuit in its case No. 29768.

OPINIONS BELOW

The opinion of the Court of Appeals is reported at 169 USPQ 132 and reprinted as Appendix A to this petition (1a, *infra*).

The decision of the District Court for the Northern District of Texas, embodied in its findings of fact and conclusions of law, is reported at 316 F.Supp. 866 and reprinted as Appendix D to this petition (11a, *infra*).

JURISDICTION

The judgment of the Court of Appeals, printed as Appendix B to this petition (9a, *infra*), was entered on March 12, 1971, and that Court's order denying petitioner's petition for rehearing en banc, printed as Appendix C to this petition (10a, *infra*), was entered on April 13, 1971. This Court has jurisdiction under 28 USC §§ 1254(1) and 2101(c).

QUESTIONS PRESENTED

This case presents important questions relating to (1) the standard of patentability to be applied in cases where the patent in suit covers a combination of individually old elements, and (2) the necessity for uniformity in the decisions of any given Court of Appeals on that subject. Specifically, the questions presented are:

1. Is the standard of patentability applied in this case by the majority decision of the Court of Appeals (which held that the combination of a jet pump and air regulating means in the manner shown and claimed in the patent in suit would have been *obvious as a matter of law* because both the jet pump and the air regulating means were individually old and in the public domain, *notwithstanding that their combination achieved a truly synergistic result* and had not been obvious as a matter of fact to the skilled engineers of respondent Hesston Corporation or to anyone else in the materials-separation field in which both the pump and regulator, separately, had been used for some 30 years) warranted by § 103 of the Patent Act (35 USC § 103) and consistent with this Court's decisions in the *A. & P.*, *Graham*, *Adams* and *Black Rock* cases?

2. Should not this court exercise its supervisory authority to insure that different panels of the same

Court of Appeals do not apply different—and conflicting—standards of patentability in judging the validity of patents which cover combinations of individually old elements?

The answer to both of these questions is, petitioner submits, self-evident. A standard of patentability which fails to consider whether a combination of individually old elements produces a new and unexpected result or achieves a synergistic effect is *not* warranted by § 103 of the Patent Act or consistent with this Court's decisions in the *A. & P.*, *Graham*, *Adams* and *Black Rock* cases. And elementary considerations of justice require that the *same* standard of patentability be applied by *all panels* of any given Court of Appeals.

STATUTORY PROVISION INVOLVED

The statutory provision involved in this case is § 103 of the Patent Act (35 USC § 103), which provides:

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

STATEMENT OF THE CASE

The patent in this case relates to a cotton harvesting machine of the type known in the farm equipment trade as a "cotton stripper" (as distinguished from a "cotton picker") because it strips both ripe and green bolls from

the cotton plants, instead of picking only the ripe or mature cotton fibers.

The claims in suit covered the cotton stripper's so-called "air elevator", which employs a jet pump to:

1. Separate the ripe cotton bolls from the heavier green cotton bolls after they have been stripped from the cotton plants. (Such separation is achieved by adjusting the flow of the jet pump's secondary air stream to a velocity sufficient to raise the lighter ripe bolls out of the separation zone or chamber, but not sufficient to lift the heavier green bolls, which are allowed to fall into a refuse bin known as the "green boll box".)
2. Deliver the ripe bolls to a collection basket or trailer after they have been separated from the green bolls. (This delivery function is performed by the jet pump's primary air stream, which picks up the ripe bolls as they emerge from the separation chamber and carries them along on a blast of air, up and out of the discharge chute to the collection point.)

Petitioner Deere & Company ("Deere"), which manufactures a full line of farm machinery and equipment, including cotton strippers, is the owner of the patent in suit (Sanderson et al. patent No. 3,397,522 (21a, *infra*), hereinafter referred to as the "Sanderson patent").

Of the three respondents, the primary party in interest is Hesston Corporation ("Hesston"), which manufactures a variety of farm machinery, including cotton strippers marketed in competition with Deere; the other parties are a wholly-owned subsidiary of Hesston (Hesston of Texas, Incorporated) and a Levelland, Texas farm equipment dealer who sells Hesston equipment (Joe Ed Crawford, doing business as Crawford Equipment Company).

The Problems Experienced With The Air Elevators Employed In Prior Art Cotton Strippers

The evidence at the trial established that cotton strippers using air elevators had been produced and sold by several U.S. manufacturers of farm machinery prior to Sanderson's development of the air elevator shown and described in the patent in suit (108-113 and 316-320).* Such companies included International Harvester, Hesston, Case, Oliver and Deere itself (108).

Discussing the nature of the problem encountered in using an air elevator to separate green cotton bolls from ripe bolls, petitioner's engineer G. Russell Sutherland testified (106):

> "The problem is to distinguish the specific weight of the green boll and the open boll and separate one from the other. It is not too difficult to do during the early part of the season when the green boll is literally green and very wet, and therefore heavy, but after a frost occurs, well, the green boll dries up and it is still an immature boll even though it is no longer green in color, and you still want to separate the immature boll from the ripe boll".

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* In this petition, references to the printed joint appendix filed in the Court of Appeals are in the form "(327)". References to exhibits reproduced in the exhibit books provided for the use of the Court of Appeals, as authorized by Rule 30(e) of the Federal Rules of Appellate Procedure, are in the form "(PX 15)" in the case of exhibits reproduced in Plaintiff's Exhibit Book, and in the form "(DX 29)" in the case of exhibits reproduced in Defendants' Exhibit Book. References to exhibits not reproduced in the exhibit books, whether because of their size or unsuitability for reproduction, are in the form "(original PX 20)". All emphasis in quotations is added unless otherwise indicated.

Sutherland then explained how the so-called "wagon elevator", used in many prior-art cotton strippers, had attempted to solve that problem. In such machines, a belt-type elevator carried the mixture of green and ripe cotton bolls up to a discharge point where the bolls were dumped across an air stream delivered by a fan (109-111; original PX 20). As Sutherland expressed it (110):

> ". . . the attempt was to have the green boll thrown across the air stream and hit the bang board, which was adjustable, and then have it drop out and have the air stream carry the mature cotton back into the trailer".

The wagon elevator construction did not do the job, however. Sutherland observed (111):

> "There were two basic problems. One, you are always compromising the amount of air you put on to get the best delivery into the trailer. *You want to put a lot of air in it, and when you did that you blew the green bolls into the trailer. You did away with the boll separation you were after.*
>
> "Secondly, the trajectory of the green boll, the cotton coming over the upper end of this boll was not precise, so you had to compromise in where you adjusted the bang board to catch the maximum number of green bolls. *You were compromising the delivery and the boll separation at the same time*".

Sutherland also told of a second prior-art air elevator called a "station separator" (111-113; original PX 21). Describing that construction, Sutherland said (111):

> ". . . it operated on the principle that took the mixture of the green and ripe cotton from some kind of a device at the bottom of the elevator, conveyed it up and dumped it into a vertical air stack which had the discharge of a fan, producing a velocity up the stack

at this point. At this point the velocity of this air stream could be regulated either by dampers on this fan or by the speed of the fan so that the velocity was sufficient to carry the mature cotton out the discharge, either into a basket or into a trailer, depending on which way discharge was aimed, but the velocity of the air stream was regulated so that the green boll would drop through the air stream and the mature cotton would be carried off".

Sutherland testified that the station separator construction also failed to do the job for which it was designed, commenting (113):

"The basic problem that was encountered with this is that the discharge velocity of the fan is essentially that which is subjected to the ripe and green bolls so that velocity has to be the separation velocity late in the season. When the differential in specific weight between the mature and green boll is very little, well, this velocity has to be slowed down in order to get separation. This usually leaves you in the position of having inadequate velocity to deliver into the basket, *so here, again, you had to compromise between delivery capacity and boll separation*".

Sanderson's Solution Of The Problems Experienced With Prior Art Air Elevators

After discussing the disadvantages encountered with the earlier air elevators used in commercial cotton stripping machines, Mr. Sutherland described the construction and operation of the air elevator in the Sanderson patent, used in Deere's Model 282 cotton stripper (113-116; 21a, *infra;* original PX 22). He explained how the bleed-in door positioned on the separation chamber can be adjusted to regulate the velocity of the secondary air stream induced by the jet pump employed in the Sanderson construction to

achieve precise separation of the ripe and green bolls, stating (114):

> "... you open or close this to the point where the ripe cotton is carried upward and the green bolls fall out. You can determine this, if you want to have less ripe cotton in the boll box—In other words, if you want to increase the velocity to carry more ripe cotton up, you restrict this opening and reduce—or increase the velocity in the separation chamber conversely if you are getting too much green bolls in the load".

The problems and disadvantages encountered with the earlier air elevators were overcome by the Sanderson air elevator; as Sutherland explained (114), with the primary and secondary air streams produced by Sanderson's jet pump, "you can always tune in the velocity you want in the separation chamber and still have the delivery velocity that you want to maintain the capacity".

Independent and impartial tests conducted at Oklahoma State University on November 21, 1967, after a killing freeze had occurred and at a time when efficient green boll separation was accordingly difficult to achieve, conclusively proved that the difference in green boll separation achieved by the Sanderson air elevator employed in Deere's Model 282 cotton stripper, on the one hand, and by the prior-art elevators then being marketed by Hesston and International Harvester, on the other hand, was so great that it amounted to an altogether new and useful result (PX 12), rather than a mere difference in degree. In those tests, the Sanderson air elevator separated more than 120 pounds of green bolls from the cotton harvested by Deere's cotton stripper, while the International Harvester air elevator separated less than 10 pounds of green bolls and the Hesston air elevator failed to separate any (PX 12, p. 38).

Commercial Success Of The Sanderson Patent

The dramatic superiority in green boll separation demonstrated by the Sanderson air elevator in the Oklahoma State University tests (PX 12) insured the commercial success of Deere's Model 282 employing the patented air elevator (21a, *infra;* PX 17-18). The composite schedule of (a) official government figures relating to cotton stripper factory shipments for the entire farm machinery industry and (b) petitioner's own records relating to shipments of Deere's cotton strippers provided with the Sanderson air elevator conclusively demonstrates that such success was achieved promptly and has continued over the years since Deere began marketing the patented air elevator (PX 19; 116-118).

Thus, since 1965, when Deere's Model 282 cotton strippers equipped with the Sanderson air elevator were introduced, petitioner's annual sales of cotton strippers have increased substantially in the face of a steady decline in annual sales by the entire industry, with the result that petitioner's share of the total U.S. market was, at the time of the trial, more than double its share of that market in 1965 (PX 19).

Hesston's Copying Of The Sanderson Air Elevator

Hesston's own sales organization—like the researchers who conducted the comparative tests at Oklahoma State University—quickly became aware that the Hesston cotton stripper provided with an earlier type of air elevator (the so-called "wagon elevator" construction, as shown in the Hesston brochure received in evidence as PX 5) could not be sold in competition with Deere's Model 282 cotton stripper equipped with the Sanderson air elevator

(162-164). Hesston's engineering department was accordingly requested to design a cotton stripper that would provide more efficient green boll separation, so as to make the Hesston machine competitive with Deere's Model 282 (162-164).

Hesston's engineering department first produced and tested a new air elevator designed by one of its own engineers, but found that it did not perform satisfactorily and discarded it (130-132). Hesston then decided to adopt an air elevator substantially like the Sanderson air elevator employed in Deere's Model 282 cotton stripper, one of which had previously been purchased by Hesston for use in the redesign of its own machine (164-166; PX 3 and 5-15; original PX 1, 2 and 4; 133-157).

Thus, with Hesston having copied the Sanderson air elevator, respondents did not contest petitioner's charge of infringement of claims 15, 16, 18 and 19 of the Sanderson patent, but conceded that Hesston's model 24-A cotton strippers infringed those claims if they were valid (25-26).

The Prior Art Patents Upon Which The Courts Below Held The Sanderson Patent Invalid

Long after Hesston's engineers had copied the Sanderson air elevator, Hesston's attorneys began a search for prior patents upon which Hesston might rely to justify its copying.

Since the Patent Office had considered all of the relevant prior art patents relating to cotton harvesters in its examination of the application upon which the Sanderson patent issued (DX 25, 27, 29 and 32-37), respondents' attorneys were driven to look for justification in unrelated fields. Eventually, they turned up a 1927 German

patent on a machine which used a jet pump to separate garbage or other waste material into its heavier and lighter components (German patent No. 453,358; 37a, *infra*) and a 1932 patent on a device which employed air to separate coffee or cocoa beans from stones and other denser materials (Herz patent No. 1,850,719; 29a, *infra*).

In holding the claims in suit invalid, the District Court relied on those two patents and the 1932 Harazin patent which had been considered by the Patent Office during the prosecution of the Sanderson application (Harazin patent No. 1,885,437; 34a, *infra*). This is what the evidence establishes with respect to those patents:

1. The Harazin Patent

The Harazin patent (34a, *infra*), which was before the Patent Office at the time it allowed the Sanderson application, discloses a "cotton harvester" designed to be used as a cotton picker (as distinguished from a cotton stripper), in which a jet pump (6) is employed, but only for the purpose of transporting the cotton fiber to the collection point. (A cotton picker does not remove green or immature cotton from the plant; it picks *only* mature cotton fibers. Thus, in a cotton picker, the separation of ripe from green cotton takes place before the cotton gets to the air elevator.) Hence, as the District Court expressly found, the Harazin machine had neither a separating chamber nor any regulating means for adjusting the volume of secondary air (14a, *infra*).

2. The German Patent

The German patent (37a, *infra*) discloses the use of a jet pump (k) in a machine for separating relatively

heavy waste materials (such as cinders) from relatively light waste materials (such as paper). In the German machine, the waste material to be separated is introduced into the jet pump's secondary air stream at a point (c), immediately above a spinning paddle (b) which breaks up the garbage. Thereupon, the heavy components fall into a collection area (l) at the bottom of the machine. The light components are carried upward to the jet pump's primary air stream, which delivers them to another collection area (h) at the upper end of the machine. The German machine also has a louvered opening (e) below the zone in which the separation of the heavier and lighter materials takes place.

Respondents' expert, Professor Razak, initially testified that he believed the machine shown in the German patent could be operated to separate ripe and green cotton bolls (259); but he subsequently conceded, on cross-examination, that opening or closing the louvers shown on the German device would have no appreciable effect on the volume of the secondary air stream drawn through the separation zone and hence could not be used to "tune" the secondary air stream to the proper value for effective boll separation (306). And petitioner's expert, Professor Powers, unequivocally testified that the device shown in the German patent would *not* successfully separate green and ripe cotton bolls (337).*

---

* Both experts agreed (303-306, 326-327) that the volume of air drawn through the secondary pipe of a jet pump is essentially constant, governed by the volume and velocity of the primary stream. In consequence, both men testified, the air stream in the separation zone cannot be regulated by means of louvers located *below* that zone, although it *can* be so regulated with louvers or dampers located *above* the separation zone.

Even so, the District Court found that the German patent "anticipates all of the four claims" in suit of the Sanderson patent (16a, *infra*).

The Court of Appeals, however, clearly indicated that the District Court had erred in so finding, for it acknowledged that none of the jet pumps used in prior art air elevators or materials-separating applications would achieve the result attained by the air elevator of the Sanderson patent—not even a jet pump provided with auxiliary air inlet means located at the point shown in the German patent. Thus, after analyzing the Harazin and German patents, Judge Bell's majority opinion expressly states:

> "It will be seen at this point that the prior art teaches the use of the jet pump to separate and to elevate. *This leaves the air regulating means as a method of maintaining an upward force sufficient to move the light material without interfering with the separation process in the separation chamber*" (5a, *infra*).

3. The Herz Patent

The Herz patent (29a, *infra*) discloses a device for separating coffee or cocoa beans from stones and other foreign matter. It did not employ a jet pump; on the contrary, it operated in precisely the fashion of the so-called "station separator" used in cotton strippers prior to the birth of the Sanderson invention. (Compare Mr. Sutherland's description of the station separator (111) with Herz' description of his machine (32a, *infra*, lines 69-85).) The Herz machine used the suction created by a conventional exhaust fan both to separate the coffee or cocoa beans and to lift them to a collection point. It had a pair of openings (18) near the top of the zone in which separation of

the coffee beans and foreign material occurred, provided with adjustable flaps (19) which, on being opened or closed, would simultaneously vary *both* the air current used for separation *and* the current available to transport the coffee beans to the collection bin.

The Herz patent was emphasized by both the District Court and the majority judges of the Court of Appeals, in their decisions holding the Sanderson patent invalid.

Thus, the District Court held that the Sanderson air elevator as defined by the claims in suit could be reproduced simply by adding the air inlet means shown in the Herz patent (a) to the machine shown in the German patent, immediately above the point at which the processed garbage is introduced (15a-16a, *infra*), or (b) to the Harazin cotton picker, above the point at which the cotton enters the Harazin air elevator, provided the Harazin elevator were *additionally* modified by adding a green boll bin (15a-18a, *infra*).

In so holding, the District Court did not take into account either the synergistic result obtained by Sanderson through his combination of the jet pump and air regulating means which were each individually old, or the fact that their combination was not suggested anywhere in the art and had not occurred to any of the skilled engineers who struggled with the problem of green boll separation before Sanderson solved it.

The majority judges of the Court of Appeals compounded the District Court's error when they equated the air regulating means in the Herz and Sanderson patents, stating:

> "We can perceive of no substantial difference in the use or result obtained from the means of air regulation in Herz and in Deere's patent" (5a-6a, *infra*).

That conclusion is unsound. The evidence in this record proves, beyond any doubt, that the Herz air regulating means does *not* operate in the same manner or obtain the same result that is achieved by the air regulating means described and claimed in the Sanderson patent—as will readily appear from a brief comparison of the two devices and review of the expert testimony regarding their operation.

The separation job for which Herz designed his machine was, of course, child's play compared to the boll separation problem which Sanderson solved. Herz was separating *roasted coffee beans* from such materials as "stones, nails and other foreign materials of a denser composition" (31a, *infra*), and it is fortunate for Herz that he had such a simple task, for his machine, inherently, was incapable of wide-range control of suction in the separation chamber. The reason is found in a fundamental scientific property of suction fans pointed out by Professor Powers in his testimony at the trial—namely, that if any additional air passages are opened on the suction side, this reduces the total resistance to flow of air in the fan, and, as a consequence, more air will flow on the suction side (327). By virtue of that suction-fan characteristic, opening the side-entry doors on a machine like that of Herz will result in a greater air flow through the riser but, at best, will only slightly (if at all) reduce the air flowing through the separation chamber (327-328).

An intrinsically different type of action occurs when, as in the invention of the Sanderson patent, the upward air flow is induced by a jet pump; and the explanation involves a scientific principle which distinguishes the operation of jet pumps from that of suction fans. As

both trial experts agreed (303-306, 326-328), the volume of air drawn through the secondary pipe of a jet pump is mainly a function of the speed and volume of primary air, and hence is essentially constant so long as the bottom opening of the secondary pipe is unrestricted. Therefore, if the secondary pipe has an adjustable air inlet in its side, every unit volume of air that enters the secondary pipe through that side inlet reduces, by an approximately equal amount, the quantity of air entering the secondary pipe at its bottom opening.

In consequence of that distinctive jet-pump characteristic, an adjustable air inlet on the separation chamber of a machine such as Sanderson's has a *vastly* greater effect on the suction in the separation zone than such an air inlet can exert in a machine, such as that of Herz, which utilizes a suction fan. If one has a jet pump providing the suction in a secondary air stream, one can, as Professor Powers put it, "control . . . the distribution of that secondary air, where it comes from" (327).

There is no dispute about the scientific facts which underlie the points just made; they were attested by Deere's expert, Professor Powers (326-328), and confirmed by Hesston's expert, Professor Razak (303-306). What they mean, as applied to the facts here, is that Sanderson achieved a real break-through in separation-zone suction control when, for the first time, a separation zone equipped with adjustable air-inlet means (admittedly old, *per se*) was combined with a jet pump as a source of suction (also admittedly old, *per se*). It is only by utilizing those two individually old elements in *combination* (a wholly novel concept) that the new result achieved by the air elevator of the Sanderson patent can

be attained—to-wit, "the velocity you want in the separation chamber," along with "the delivery velocity that you want" (114).

That new result truly *does* exceed the sum of its parts—i.e., it is more than the sum of the individual functions of the old elements in their prior-art environments. Thus, the jet pump used alone affords no means of suction control in the separation zone except by variation of such things as fan speed and pipe size, and under those conditions the suction available for carrying the crop upward through the secondary pipe is always the *same* suction as that present in the separation zone. Again, adjustable inlets on the separation zone, in their Herz prior-art setting, afforded little or no control of suction in the separation zone, since opening or closing them results, primarily, in changing *the total flow of air through the riser above the separation zone* rather than changing the air flow *through* the separation zone.

True, the Herz patent states that adjustment of the Herz dampers or air regulating means will have the effect of "reducing the amount of air passing up the boot" (32a, *infra*, lines 83-84), but the testimony of the expert witnesses called by both Deere and Hesston shows that assertion to be erroneous (303-306, 326-328).*

The view of the majority that there is "no substantial difference in the use or result obtained from the means of air regulation in Herz and in Deere's patent" (5a-6a, *infra*) is, therefore, also shown to be clearly erroneous; the expert testimony establishes that there are substantial differences indeed—namely, that use of the

* An unsworn assertion in a patent obviously can have no probative value as against the sworn testimony of two experts, representing opposing interests.

air regulation means employed in the *Herz* device *increases the total flow of air in the riser above the regulating means but has no appreciable effect on the velocity of the air stream in the separation chamber,* whereas use of the air regulation means employed by *Sanderson reduces the velocity of the air stream in the separation chamber without affecting in any way the velocity of either of the air streams in the elevator above the regulating means.*

Uncontradicted evidence thus proves that Sanderson's combination of a jet pump and air regulating means positioned on the separation chamber did achieve a truly synergistic result, far exceeding the sum of the individual functions separately performed by the jet pumps and air regulating means that had been employed in the prior art machines. Sanderson's combination produced a machine with which optimum boll separation could be achieved by precision adjustment of the velocity of the air stream in the separation chamber, without impairing, or affecting, in the least degree, the velocity of the jet pump's primary air stream, relied on to deliver the ripe bolls to the collection point after the green bolls have been separated out and deposited in the refuse bin.

REASONS FOR GRANTING THE WRIT

I. The Majority Decision Of The Court of Appeals Is In Direct Conflict With This Court's Decisions Holding That A Valid Patent May Be Obtained On A Combination Of Individually Old Elements Which In Congress Produce A Synergistic Effect.

The legal theory underlying the majority decision holding the patent in suit invalid is clearly set forth in the following excerpt from the majority opinion filed March 12, 1971:

> "Thus it appears that the jet principle was old in a similar field of endeavor as was the air regulating means. *Both the jet principle and the air regulating means principle are in the public domain. The combination of these known elements produced a useful function but* the district court did not err in concluding *as a matter of law* on the fact presented that *the combination would have been obvious* to those skilled in the art. It is clear that the claims in suit did not constitute an invention by the obvious-nonobvious standard.
>
> *"It is a peculiarity of patent law that it avails Deere nothing to point out that the combination was not obvious to defendant's engineers who gave up and copied Deere's machine.* The patent monoply may not be extended to remove existent and available knowledge from the public domain" (6a, *infra*).

As Judge Jones pointedly observes in his dissenting opinion, the net result is that "The patent which is the subject of this appeal has been hindsighted by the majority into invalidity" (6a, *infra*)—despite the fact that the device covered by its claims was a "unique and useful discovery which had . . . long eluded the searches of the experts" (8a, *infra*).

Implicit in the majority decision is a standard of patentability that cannot be met by any invention which comprises a combination of individually old elements, regardless of the result their combination achieves. Simply stated, the majority judges of the Court of Appeals held that, because both the jet pump and air regulating means were in the public domain, their combination would have been obvious as a matter of law, despite the uncontradicted proof that the combination (a) was *not* obvious as a matter of fact and (b) achieved a true synergistic result.

A survey of the patent opinions of the Court of Appeals for the Fifth Circuit since this Court's decisions in *Graham* v. *John Deere Co.* (1966), 383 U.S. 1, and *United States* v. *Adams* (1966), 383 U.S. 39, indicates that the standard of invention applied by the majority judges in this case, or a closely comparable standard, has been applied in three other cases (*Zero Manufacturing Co.* v. *Mississippi Milk Pro. Ass'n.* (1966), 358 F.2d 853; *Up-Right, Inc.* v. *Safway Products, Inc.* (1966), 364 F.2d 580; and *Sisko* v. *Southern Resin & Fiberglass Corporation* (1967), 373 F.2d 866).

The decision in the first of those three cases was written by District Judge Dawkins, sitting by designation as a member of the Court of Appeals. The basis on which the patent there in suit was held invalid was summed up by Judge Dawkins when he said:

> "*What moves us, in the last analysis, is that appellant's device* has added nothing to the sum of knowledge in the industry which is so new and useful as to entitle it to a monopoly upon that item. It *consists of nothing more than a combination of ideas drawn from the existing fund of public knowledge.*

> As was said in Graham, the claims in issue 'must fall as not meeting the test of § 103, since the differences between them and the pertinent prior art would have been obvious to a person reasonably skilled in that art'. 86 S.Ct. at 703. That appellant was the first skilled in the art who actually produced a refrigerated vacuum bulk milk tank apparatus does not amount to patentable invention under our law" (*Zero Manufacturing Co.* v. *Mississippi Milk Pro. Ass'n.* (1966), 358 F.2d 853, 859).

The opinions of the Court of Appeals in both of the other cases were, like the opinion of that Court in this case, written by Judge Bell (*Up-Right, Inc.* v. *Safway Products, Inc.* (1966), 364 F.2d 580; *Sisko* v. *Southern Resin & Fiberglass Corporation* (1967), 373 F.2d 866). In one of those cases, moreover—again as in the case at bar—there was a vigorous dissenting opinion (*Up-Right, Inc.* v. *Safway Products, Inc.* (1966), 364 F.2d 580, 584-586).

Judge Bell's opinion in the *Up-Right* case makes it clear that the majority decision there was based, in large part, on the fact that the structure covered by the claims of the patent in suit could be produced by combining two prior art references (just as the device covered by the claims of the patent in suit in this case can be produced by combining the jet pump shown in the Harazin prior art patent and the air regulating means employed in the Herz patent). Thus, Judge Bell's opinion states:

> "The structure of the patent in suit would be obvious from *an overlay of a sketch of the Boeing scaffold or the Southern California wind tunnelling scaffold on a sketch of the structure of the Cederquist patent* . . .

"We are under the decided impression that this prior art, when considered together, would furnish a sufficient basis for a person skilled in the scaffolding art to achieve the desired result of a portable and foldable scaffold with interior stairway for support and safety which might be constructed in a manner so as to stack one upon another to achieve any desired height. *This result is the structure of the claims in suit. Therefore, it follows that the District Court was not in error in holding them invalid.* The subject matter of these claims did not rise to the level of an invention within the meaning of the patent laws for want of 'nonobviousness' over the prior art" (*Up-Right, Inc.* v. *Safway Products, Inc.* (1966), 364 F.2d 580, 583-584).

Senior Judge Marvin Jones of the United States Court of Claims, sitting as a member of the Court of Appeals in the *Up-Right* case, dissented from the majority decision, stating:

"I feel strongly that the patent in suit passes the test of nonobviousness, formulated by the Patent Act of 1952, 35 U.S.C. § 103 (1964), and construed by the Supreme Court in Graham v. John Deere Co., 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966). *The majority of this court, and the court below, although professing to be guided by the factual inquiries specified in Graham, in my judgment misapply these tests and thereby reach an erroneous legal conclusion.*

• • •

"The test is obviousness to a skilled mechanic in the field. *In Graham, the Supreme Court twice emphasizes that the standard of patentability has not changed.* 383 U.S. at 17 and 19, 86 St.Ct. 684. The test has simply been clarified. If what the claims in issue did was obvious, then *the majority decision by this Court has measurably changed the standard,* which in the light of Graham it ought not to do" (364 F.2d 584-585).

The standard of patentability applied in the aforementioned decisions of the Court of Appeals over the objection of the dissenting judges (and also applied in *Sisko* v. *Southern Resin & Fiberglass Corporation* (1967), 373 F.2d 866) is not the same as—but much more stringent than—the standard of patentability enunciated by this Court in its decisions in the *A. &P.*, *Graham, Adams* and *Black Rock* cases.

Thus, in *Anderson's-Black Rock* v. *Pavement Salvage Co.* (1969), 396 U.S. 57, this Court made it clear that "A combination of elements may result in an effect greater than the sum of the several effects taken separately," in which event the combination would be patentable, although pointing out that "No such *synergistic* result is argued here" (396 U.S. 61).

While the term "synergistic" was apparently first used in that context by this Court in the *Black Rock* case, the standard of patentability inherent in that term had previously been articulated in *A. &P. Tea Co.* v. *Supermarket Equip. Corp.* (1950), 340 U.S. 147, where Justice Jackson said:

> "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable" (340 U.S. 152).

That same standard of patentability was reiterated in *Graham* v. *John Deere Co.* (1966), 383 U.S. 1, and a combination of individually old elements which achieved a new and unexpected result (i.e., a synergistic effect) was held patentable by this Court in *United States* v. *Adams* (1966), 383 U.S. 39.

In short, the Court of Appeals has failed to heed—and refused to follow—this Court's decisions in the *A. &P.*, *Graham, Adams* and *Black Rock* cases. This Court should,

therefore, exercise its certiorari jurisdiction to eliminate the conflict between the decisions of the Court of Appeals and the controlling decisions of this Court regarding the standard of patentability to be applied in cases where the patent in suit covers a combination of individually old elements which produce a synergistic result.

II. This Court Should Not Permit Different Panels Of The Same Court Of Appeals To Apply Different—And Conflicting—Standards Of Patentability.

The decision of the majority judges of the Court of Appeals in this case not only fails to follow the controlling decisions of this Court in the *A. &P., Graham, Adams* and *Black Rock* cases, but is also in conflict with recent decisions handed down by other panels of the Court of Appeals for the Fifth Circuit subsequent to this Court's decisions in the *Graham* and *Adams* cases.

Thus, in *Gray Company* v. *Spee-Flo Manufacturing Corporation* (1966), 361 F.2d 489, the Court of Appeals for the Fifth Circuit, in an opinion written by Chief Judge Tuttle, held that the patent there in suit was not invalid as obvious, despite the fact "that the use of a pre-orifice in approximately the same position as shown by the patent in suit, in itself, is not new", pointing out that the "contribution of the invention was ascertainment and recognition of the fact that if the pre-orifice is reduced in size to approximately the same as the spray orifice, the improvement in the spray pattern is accomplished" (361 F.2d 491).

Patents whose validity had been attacked on the ground of obviousness were also held valid by other panels of the Court of Appeals for the Fifth Circuit in *Hensley*

Equipment Co. v. *Esco Corp.* (1967), 383 F.2d 252, *Smith Industries International* v. *Hughes Tool Co.* (1968), 396 F.2d 735, *Williams Bit & Tool Co.* v. *Christensen Diamond Products Co.* (1968), 399 F.2d 628, and *Sterner Lighting, Inc.* v. *Allied Electrical Supply, Inc.* (1970), 431 F.2d 539.*

Perhaps the best statement of the standard of patentability applied in the latter group of cases—and the standard that *should* be applied in all cases involving patents whose claims cover a combination of individually old elements—is found in the recent decision of the Court of Appeals in *Sterner Lighting, Inc.* v. *Allied Electrical Supply, Inc.* (1970), 431 F.2d 539, where Judge Thornberry said:

> "Obviousness is a difficult, elusive standard to apply. The Supreme Court has recently dealt with the concept in several opinions. In one such case, United States v. Adams, 1965, 383 U.S. 39, 86 S.Ct. 708, 15 L.Ed.2d 572, the Court considered a patent on a special kind of battery. The patent specifically described the components and their relation to each other. *The components were all known, but the combination was a specific solution to technical problems that required the exercise of some skill because the components had to be chosen so that they worked together.* The Court therefore held the patent valid. By contrast, in Anderson's-Black Rock, Ind. v. Pavement Salvage Co., 1969, 396 U.S. 57, 90 S.Ct. 305, 24 L.Ed.2d 258,

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* In *Metal Arts Company* v. *Fuller Company* (1968), 389 F.2d 319, the Court of Appeals, in an opinion written by Judge Bell, sustained the validity of still another combination patent, pointing out that the prior art device "could not have been used, without modification, to accomplish the ends" achieved by the patented device (389 F.2d 323)—an explanation consistent with Judge Bell's apparent view that a combination which can be duplicated by an assembly of old elements, *without modification* of any of the elements, is obvious as a matter of law and, hence, unpatentable.

> the Court held a patent on a device to lay asphalt pavement invalid. The device was the first successful machine of its kind. But *it was merely a combination of known elements that produced no synergistic result*, to which the patentee had contributed no novel arrangement. His patent was invalid because it required him to do nothing but adopt known components, and it was not saved by the fact that no one had ever so used them before. See also Graham v. John Deere & Co., supra; cf. Beckman Instruments, Inc. v. Chemtronics, Inc., supra. Our question on this appeal is whether the Sterner patent is closer to the Adams or to the Anderson's-Black Rock situation, and it appears from the decisions that *the key* to this *question is whether the patentee has solved nontrivial technical problems by purposefully manipulating variables so as to elicit a synergistic result from his materials*" (431 F.2d 541-542).

Applying that test, the Court held that the patent involved in that case was "not invalid for obviousness" even though "the relevant art is not highly sophisticated" and the "invention itself is not very sweeping or impressive" (431 F.2d 542).

There can be no doubt that the standard of patentability applied in this case by Judges Bell and Simpson, with Judge Jones dissenting (and by other panels of the same Court of Appeals in the *Zero Manufacturing, Up-Right* and *Sisko* cases), is not the same standard of patentability that was applied in the *Sterner Lighting* case by Judges Gewin and Thornberry, with Chief Judge Brown dissenting (and by the particular panels of the Court of Appeals which heard and decided the *Spee-Flo, Hensley, Hughes* and *Williams Bit* cases).

At the present time, therefore, lawyers cannot advise their clients what standard of patentability may be applied by the Court of Appeals for the Fifth Circuit in cases

where the patent in suit covers a combination of individually old elements which, in congress, produce a synergistic effect.

This Court should exercise its supervisory authority to end that situation, and insure that all panels of the Court of Appeals for the Fifth Circuit apply the same standard of patentability in such cases.

Conclusion

This Court's recent decision in *Blonder-Tongue Laboratories Inc.* v. *University of Illinois Foundation*, ... U.S. ....., 39 Law Week 4506, eliminates—for all practical purposes—the possibility that two Courts of Appeals will hereafter reach different conclusions regarding the validity of the same patent.

With that traditional avenue of certiorari effectively closed, this Court should now take a more liberal attitude toward petitions for certiorari in cases where a Court of Appeals has handed down a decision which fails to heed the controlling decisions of this Court or is in conflict with other decisions handed down by different panels of the same Court of Appeals.

The petition for certiorari in this case should accordingly be granted, and the decision of the Court of Appeals reversed.

Respectfully submitted,

Dugald S. McDougall
Theodore R. Scott
135 South LaSalle Street
Chicago, Illinois 60603
Attorneys for Petitioner

APPENDIX A

Opinion of the Court of Appeals

IN THE
UNITED STATES COURT OF APPEALS
FOR THE FIFTH CIRCUIT

No. 29768

DEERE & COMPANY
Plaintiff-Appellant,
versus
HESSTON CORPORATION, HESSTON OF TEXAS, INC., ET AL.,
Defendants-Appellees.

Appeal from the United States District Court for the Northern District of Texas

(March 12, 1971)

Before JONES, BELL, and SIMPSON, Circuit Judges.

BELL, Circuit Judge: This appeal arises out of litigation over a patent. Deere & Company brought an action against defendants charging infringement of Claims 15, 16, 18 and 19 of its patent (U.S. Letters Patent No. 3,397,522 entitled "Cotton Harvester"). By way of a counterclaim defendants sought a declaratory judgment that the claims in suit were invalid. Infringement was subsequently admitted by defendants, thus leaving only the validity issue for trial. The district court concluded that the claims were invalid and we affirm.

The device of the patent is the air elevator portion of a cotton stripper wherein ripe and green cotton bolls previously stripped from the cotton stalk are to be separated. The essence of the invention is to eliminate the green bolls in a separation chamber while advancing the ripe bolls through an air elevator to a collection point. The ripe bolls are drawn from the separation chamber by an air system through a blower duct extending vertically in an upward direction from the chamber.

The problem in the industry had been the inability to separate the green and ripe bolls once the green bolls began to dry out during the latter part of the season. The practice in the industry was to discharge the ripe bolls through the vertical air duct by producing an air velocity through the use of a fan. In so doing the lighter green bolls were carried through the duct to the collection point along with the ripe bolls. This could be avoided by reducing the air velocity but this resulted in a velocity which was inadequate to carry the ripe bolls upward through the duct.

Under Deere's patent, a jet pump was substituted for the fan thus creating a primary and secondary air stream. The secondary air stream created a suction, thereby pulling the bolls upward through the duct to be moved to the collection point in combination with the primary air stream. In order to solve the problem of moving only the ripe bolls, Deere employed a means of regulating the velocity of the secondary air stream which was induced by the jet pump. It is a part of the Deere invention to use an air regulating means in the form of an opening above the separation chamber to control the intensity of the secondary stream so as to maintain differing velocities between the air in the separation chamber and in the duct above the opening. This air regulating means or opening is in the form of a window on the vertical duct and above the separation chamber. The velocity of the air stream as between the

separation chamber and the duct is regulated by the degree to which the window is opened.

The evidence demonstrated that the result of the Deere device was such that in a test it separated more than 120 pounds of green bolls from the stripped bolls while the nearest competitor separated less than 10 pounds of green bolls. The Deere harvester, employing the patented air elevator, enjoyed immediate commercial success.

Hesston became aware that its cotton stripper could not compete with Deere's stripper as equipped with the new air elevator and its engineering department was requested to design a competitive machine. Their efforts were finally discarded as unsuccessful and it was decided to copy Deere's air elevator. This fact is not contested and it is conceded that Hesston's model 24-A cotton stripper infringes the claims in suit if they are valid.

The district court found that the patent in suit was a mere combination of elements found in the prior art; that certain prior art patents were more pertinent references against the claims in issue than those considered by the Patent Office; that the lack of invention was plain; and that commercial success was not a substitute for invention. The prior art patents which the court deemed more pertinent were the Harazin Patent No. 1,855,437; Herz Patent No. 1,850,719, Gerson Patent No. 453,358, a German patent. Of these, only Harazin was called to the attention of the Patent Office. The court concluded that the claims in suit would have been obvious at the time the alleged invention was made to a person having ordinary skill in the art in question in light of these patents.

The approach to be used in determining obviousness or nonobviousness under the patent statutes, 35 USCA,

§ 103,[1] was stated in *Graham* v. *John Deere Co.*, 1966, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, as follows:

> ". . . Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. . . ." 383 U.S. at 17.

See also *Anderson's-Black Rock* v. *Pavement Salvage Co.*, 1969, 396 U.S. 57, 90 S.Ct. 305, 24 L.Ed.2d 258; *Sisko* v. *Southern Resin & FiberGlass Corporation*, 5 Cir., 1967, 373 F.2d 866; *Up-right, Inc.* v. *Safway Products, Inc.*, 5 Cir., 1966, 364 F.2d 580.

We turn then to assaying the pertinent prior art in an effort to determine the correctness of the conclusion of the district court. As will be seen, the pneumatic elevation of cotton and other material as well as pneumatic separation of heavy and light materials was old in the art. Deere combined a jet pump with an air regulating means to solve an extant problem in the cotton harvesting field. It is undisputed that this combination performed a useful function and achieved wide commercial success. The question is whether the combination was ". . . an invention by the obvious-nonobvious standard." *Anderson's-Black Rock* v. *Pavement Salvage Co.*, supra, 396 U.S. at 62-63.

The Harazin patent, cited to the Patent Office by plaintiff, teaches the use of a jet pump in an air elevator to convey cotton. The secondary streams of air

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[1] § 103:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

lifts the cotton out of a chamber and into the primary air stream which operates, in turn, to blow the cotton upward through a duct into a collection point. Harazin did not teach the use of the secondary stream to separate light and heavy materials in conjunction with a separation chamber. Harazin did not embrace the prime essential in Deere's patent: a regulating means for affecting the intensity of the secondary stream in connection with the separation chamber.

Gerson, a German patent, was not cited by the Patent Office. It covered an invention to separate the different ingredients in processed garbage by weight. It employed the jet pump principle for use in the separation chamber and to elevate the lighter materials through a duct to a collection point. There is some indication of an air regulating means in the form of louvers but no indication of regulating the intensity of the secondary ar stream as between the force below and above the regulating means as in the patent in suit. It will be seen at this point that the prior art teaches the use of the jet pump to separate and to elevate. This leaves the air regulating means as a method of maintaining an upward force sufficient to move the light material without interfering with the separation process in the separation chamber.

This brings us to the Herz patent. It uses a suction fan as distinguished from a jet pump to separate stones and the like from coffee and cocoa beans, peanuts, grains and similar materials and to elevate the lighter materials. It teaches the use of windows between the separation chamber and the vertical air duct as air regulating means to maintain the velocity of the air stream above the windows while reducing the velocity below the windows. The result is different velocities in the same column of air; i.e., as between the lower level (the separation chamber) and the upper level (the elevator or vertical duct). This is the point where Deere fails in its effort to sustain the validity of the claims in suit. We can perceive of no substantial dif-

ference in the use or result obtained from the means of air regulation in Herz and in Deere's patent.

Thus it appears that the jet principle was old in a similar field of endeavor as was the air regulating means. Both the jet principle and the air regulating means principle are in the public domain. The combination of these known elements produced a useful function but the district court did not err in concluding as a matter of law on the fact presented that the combination would have been obvious to those skilled in the art. It is clear that the claims in suit did not constitute an invention by the obvious-nonobvious standard.

It is a pecularity of patent law that it avails Deere nothing to point out that the combination was not obvious to defendant's engineers who gave up and copied Deere's machine. The patent monopoly may not be extended to remove existent and available knowledge from the public domain. *Graham* v. *John Deere Co.*, 383 U.S. at 5-6.

AFFIRMED.

JONES, Circuit Judge, dissenting: The patent which is the subject of this appeal has been hindsighted by the majority into invalidity. We do not here have a dormant field where no one was attempting to advance the art. The need for a device which would do an efficient job of boll separation had been apparent for a long time. Hesston and others had sought for years to effect a mechanism which would accomplish this purpose. After years of effort, Deere, through the mechanism covered by the Sanderson patent, achieved the desired result.

Although the device is now obvious to the majority, it eluded for a long time the searches and researches of the experts in the area of the art. The language of the Supreme Court in the Goodyear-Ray-O-Vac case is pertinent. There it is said:

> "Viewed after the event, the means Anthony adopted seem simple and such as should have been

obvious to those who worked in the field, but this is not enough to negative invention. During a period of half a century, in which the use of flashlight batteries increased enormously, and the manufacturers of flashlight cells were conscious of the defects in them, no one devised a method of curing such defects. Once the method was discovered it commended itself to the public as evidenced by marked commercial success. These factors were entitled to weight in determining whether the improvement amounted to invention and should, in a close case, tip the scales in favor of patentability. Accepting, as we do, the findings below, we hold the patent valid and infringed." *Goodyear* v. *Ray-O-Vac Co.*, 321 U.S. 275, 88 L.Ed. 721, 64 S.Ct. 593. See also *Graham* v. *John Deere Co.*, 383 U.S. 1, 15 L.Ed.2d 545, 86 S.Ct. 684.

Pertinent also is the following language of the Supreme Court:

"Many things, and the patent law abounds in illustrations, seem obvious after they have been done, and, "in the light of the accomplished result,' it is often a matter of wonder how they so long 'eluded the search of the discoverer and set at defiance the speculations of inventive genius.' *Pearl* v. *Ocean Mills*, 11 Off. Gaz. 2. Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any. . . ." *Diamond Rubber Co.* v. *Consolidated Rubber Tire Co.*, 220 U.S. 428, 55 L.Ed. 527, 31 S.Ct. 444.

The principle which ought to furnish the guide to the decision here is stated by the Fourth Circuit in this language:

"Obviousness does not mean that one skilled in the art can perceive the solution after it has been found and pointed out by someone else; the test of obvious-

ness is as of an earlier time, when the search is on." *Honolulu Oil Corporation* v. *Shelby Poultry Co.*, 4th Cir. 1969, 293 F.2d 127.

This Court has said:

". . . In determining whether invention exists in a given device, courts should guard against over-simplification through a hindsight view of the problem as originally encountered." *Graham* v. *Jeoffroy*, 5th Cir., 1953, 206 F.2d 769.

The patented device was discovered after years of fruitless search by experts on behalf of both of the parties to this appeal and others. Upon its discovery and manufacture it met with marked commercial success.

I am not persuaded that the early patents show any anticipation of the device of Deere. It seems to me unjust and not in keeping with the spirit or letter of the patent law to deny protection to the unique and useful discovery which had so long eluded the searches of the experts. I dissent.

APPENDIX B

Judgment of the Court of Appeals

UNITED STATES COURT OF APPEALS

FOR THE FIFTH CIRCUIT

October Term, 1970

No. 29768

D. C. Docket No. CA 5-662

DEERE & COMPANY,
Plaintiff-Appellant,

versus

HESSTON CORPORATION, HESSTON OF TEXAS, INC., ET AL.,
Defendants-Appellees.

Appeal from the United States District Court for the Northern District of Texas

Before JONES, BELL and SIMPSON, Circuit Judges.

J U D G M E N T

This cause came on to be heard on the transcript of the record from the United States District Court for the Northern District of Texas, and was argued by counsel;

On Consideration Whereof, It is now here ordered and adjudged by this Court that the judgment of the said District Court in this cause be, and the same is hereby, affirmed;

It is further ordered that plaintiff-appellant pay to defendants-appellees, the costs on appeal to be taxed by the Clerk of this Court.

JONES, Circuit Judge, dissenting: March 12, 1971

Issued As Mandate: April 21, 1971

APPENDIX C

Court of Appeals
Order denying Petition for Rehearing

IN THE
UNITED STATES COURT OF APPEALS

No. 29768

DEERE & COMPANY
Plaintiff-Appellant,
versus
HESSTON CORPORATION, HESSTON OF TEXAS, INC., ET AL.,
Defendants-Appellees.

Appeal from the United States District Court for the Northern District of Texas

ON PETITION FOR REHEARING AND PETITION FOR REHEARING EN BANC

(Opinion Mar. 12, 1971, 5 Cir., 1971, —— F.2d ——).

(April 13, 1971)

Before JONES, BELL and SIMPSON, Circuit Judges.

Per Curiam: The Petition for Rehearing is Denied and no member of this panel nor Judge in regular active service on the Court having requested that the Court be polled on rehearing en banc, (Rule 35 Federal Rules of Appellate Procedure; Local Fifth Circuit Rule 12) the Petition for Rehearing En Banc is Denied.

APPENDIX D

Decision of the District Court

IN THE UNITED STATES DISTRICT COURT
For The Northern District of Texas
Lubbock Division
(Caption—Civil Action No. CA-5-662)

FINDINGS OF FACTS
and
CONCLUSIONS OF LAW
(Filed Mar 23 1970)

The above-entitled cause having come on for trial and the Court having duly considered the evidence, and being fully advised in the premises, the Court now makes the following:

FINDINGS OF FACT

1. This is an action charging infringement by defendants of Claims 15, 16, 18 and 19 of plaintiff's U. S. Patent No. 3,397,522, entitled "Cotton Harvester," in which defendants have filed a counterclaim for a declaratory judgment holding that said claims are invalid.

2. Plaintiff Deere & Company is a Delaware corporation having its principal place of business at Moline, Illinois; defendant Hesston Corporation is a Kansas corporation having its principal place of business at Hesston, Kansas; defendant Hesston of Texas, Inc., is a Texas corporation having a place of business in Dallas, Texas; and defendant Joe Ed Crawford is a resident of Levelland, Texas, doing business as Crawford Equipment Company in that city.

3. Defendants do not contest plaintiff's charge that Model 24-A cotton harvesters of the type marketed by defendant Hesston Corporation prior to September, 1969

infringe Claims 15, 16, 18 and 19 of plaintiff's U. S. Patent No. 3,397,522; they conceded that if said claims are valid, said Model 24-A cotton harvesters infringe them.

4. During the prosecution of the application which matured into plaintiff's patent in suit, the following prior art patents were cited by the Examiner (Def. Exh. 25, p. 29):

Baldwin	No. 911,802 (Def. Exh. 27)
Boone	No. 2,406,058 (Def. Exh. 32)
Miller, et al	No. 2,673,438 (Def. Exh. 33)
Andrews	No. 2,807,925 (Def. Exh. 34)
Bopf	No. 2,820,989 (Def. Exh. 35)
Sisulak	No. 2,833,409 (Def. Exh. 36)
Fowler	No. 2,861,298 (Def. Exh. 37)

5. Claim 15 of said application was initially rejected under 35 U.S.C. 103 as unpatentable over Andrews No. 2,807,925 (Def. Exh. 34) in view of Baldwin No. 911,802 (Def. Exh. 27). (Def. Exh. 25, p. 28).

6. The Patent Office failed to cite Harazin No. 1,885,437 (Def. Exh. 29) whereupon plaintiff called this patent to the attention of the Patent Office (Def. Exh. 25, p. 42).

7. Claims 15, 16, 18 and 19 here in issue were revised by plaintiff in its response to the rejection (Def. Exh. 25, pp. 39, 40).

8. In its argument for the allowance of Claim 15, plaintiff represented to the Patent Office as follows:

> "The air regulating means that is provided in the present structure and as set forth in claim 15 is in the separating chamber and does in effect adjust the intensity of the secondary stream in relation to the mixture. This feature is important for if the air in the separating chamber is fed entirely from the exterior, there will be no suction created in the mixture. * * * It should be noted in the references cited the air regulating means has been for the purpose of adjusting the air in the primary duct and not in a chamber in which air is being drawn

by the primary duct. Therefore, it is believed that the references cited do not teach the principle of claim 15." (Def. Exh. 25, p. 45).

9. The Court finds that the limitation of the claims in issue reading: "air regulating means on the separating chamber for effecting the intensity of the secondary stream in relation to the mixture" was a feature important to the allowance of the claims in issue based on the prior art considered by the Patent Office.

10. The Court finds additionally that the references cited by the Patent Office disclose and describe air regulating means for the purpose of adjusting the air in the primary duct and not in a chamber in which air is being drawn by the primary duct.

11. The Harazin patent No. 1,885,437 (Def. Exh. 29) illustrates and describes the same arrangement as that illustrated and as described in the patent in suit and as set forth by claim 15 in issue with respect to the following parts and limitations:

a cotton harvester having discharge means in which cotton is discharged in a commingled mixture of ripe and green bolls,

a chamber in material receiving relation to the discharge means for receiving the mixture,

a duct structure projecting from the chamber and having an intake end offset from the chamber,

a blower having an outlet directed into the intake end of the duct directing a primary stream of air through the duct, and

communicating means between the chamber and duct opening into the duct whereby the primary stream of air will induce a secondary stream of air in the chamber.

12. The Harazin patent No. 1,885,437 (Def. Exh. 29) also illustrates and describes the same arrangement as that illustrated and described in the patent in suit and as set forth by claims 16, 18 and 19 in issue with respect to the following limitations:

the duct is vertically disposed,
the chamber is at the base thereof,
the blower outlet is directed upwardly,
the communicating means is an opening between the chamber and duct above the blower outlet,
the blower outlet and the opening of the communicating means open into the duct and
are closely adjacent to one another
with one being substantially on the main axis of the duct and
the other being offset from the axis and adjacent said outlet, and wherein
the primary stream of air is introduced into the duct through the blower outlet and
is directed along the primary axis of the duct and
the opening of the communicating means into the duct is offset from the axis.

13. The air elevator for cotton as disclosed and described in the Harazin patent No. 1,885,437 (Def. Exh. 29) does not separate the ripe from the green bolls of the mixture discharged into the chamber in which secondary air is induced by the primary stream of air, and does not provide for air regulating means on such chamber.

14. Air regulating means for effecting the intensity of a stream of air used to separate and elevate light materials from a commingled mixture had, however, been disclosed and described long prior to the effective date of plaintiff's patent, as evidenced by the disclosures and descriptions of the following prior art patents not cited or considered by the Patent Office:

Gillette	No. 888,158 (Def. Exh. 26)
Gerson	No. 453,358 (Def. Exhs. 38, 39)
Herz	No. 1,850,719 (Def. Exh. 28)
Eissmann	No. 2,173,088 (Def. Exh. 30)
Randolph	No. 2,205,173 (Def. Exh. 31)

15. Herz No. 1,850,719 (Def. Exh. 28), for example, discloses apparatus for separating light and heavy ma-

terials wherein a fan induces the flow of a stream of air upwardly in a separating chamber, into which chamber the commingled mixture is discharged, for separation and upward flow of the light materials, and gravitation of heavy materials below the discharge means, together with air regulating means on the separating chamber above the discharge means for effecting the intensity of the air rising in the separation chamber in relation to the mixture.

16. The German patent, Gerson No. 453,358 (Def. Exhs. 38, 39), illustrates and describes essentially the same components and geometrical relationship of parts as outlined in Findings 11 and 12 above with respect to Harazin No. 1,885,437 (Def. Exh. 29), and discloses and describes additionally the separation of light from heavy materials, the elevation by induced air of only the light materials from the separation chamber into the discharge duct, the gravitation of the heavy materials from the separating chamber, and Herz Patent No. 1,850,719 shows the use of air regulating means on the separating chamber for effecting the intensity of the induced secondary air in relation to the mixture. (Finding 15 above).

17. The Herz patent, No. 1,850,719 (Def. Exh. 28), fully discloses and describes the way in which the cotton elevator of Harazin No. 1,885,437 (Def. Exh. 29) may be used, without exercise of invention, to separate ripe from green bolls by merely providing on the induced air chamber of Harazin the air regulating means on the separating chamber of Herz, and the outlet for heavy materials as illustrated and described by Herz.

18. To the extent that it may be contended that the alleged invention as set forth in claims 15, 16, 18 and 19 of plaintiff's patent No. 3,397,522 in suit is not identically disclosed, illustrated or described by the German patent, Gerson No. 453,358 (Def. Exhs. 38, 39), the differences between the subject matter of said claims and the German patent are such that the subject matter as a whole would have been obvious at the time the alleged

invention was made to a person having ordinary skill in the art to which said subject matter pertains (35 U.S.C. 103), and the Gerson patent No. 453,358 anticipates all of the four claims of the Plaintiff's patent which are involved in this suit.

19. By providing, in conjunction with Harazin's air elevator in patent No. 1,885,437, an air regulating means on the separating chamber and the means to discharge heavy materials as disclosed, illustrated and described by both Herz patent No. 1,850,719 (Def. Exh. 28) and by the Gerson patent No. 453,358 (Def. Exhs. 38, 39), for the purpose of separating ripe from green bolls, the alleged invention set forth in claims 15, 16, 18 and 19 in issue would have been obvious (35 U.S.C. 103).

20. The provision in the air elevator for cotton disclosed by Harazin No. 1,885,437 (Def. Exh. 29) of the air regulating means on the separating chamber and the means to discharge heavy materials as disclosed, illustrated and described by Herz No. 1,850,719 (Def. Exh. 28) for the purpose of separating ripe from green bolls would have been obvious at the time of the alleged invention set forth in claims 15, 16, 18 and 19 in issue (35. U.S.C. 103).

21. The provisions on the separating chamber of the air elevator of Gerson No. 453,358 (Def. Exhs. 38, 39) of the air regulating means on the separating chamber as disclosed, illustrated and described by Herz No. 1,850,719 (Def. Exh. 28) would have been obvious at the time of the alleged invention set forth in claims 15, 16, 18 and 19 in issue (35 U.S.C. 103).

22. The prior art patents relied on by defendants in this action (Finding No. 14 above) and not cited or considered by the Patent Office, disclosing and describing air regulating means for effecting the intensity of a stream of air used to separate and elevate light materials from a commingled mixture, constitute better and more pertinent references against claims 15, 16, 18 and 19 of plaintiff's U. S. patent No. 3,397,522 than any of the

prior art patents relating to air regulating means for adjusting air in the primary duct cited and considered by the Patent Office during the prosecution of the application for plaintiff's patent.

23. The German patent, Gerson No. 453,358 (Def. Exhs. 38, 39), relied on by defendants in this action and not brought to the attention of or considered by the Patent Office during the prosecution of the application for plaintiff's patent constitutes a better and more pertinent reference against claims 15, 16, 18 and 19 of plaintiff's U. S. patent No. 3,397,522 than Harazin No. 1,885,437 (Def. Exh. 29).

24. The Herz patent No. 1,850,719 (Def. Exh. 28) relied on by the defendants in this action and not cited or considered by the Patent Office, disclosing, illustrating and describing air regulating means on a separating chamber in which air is induced by a fan for the purpose of effecting the intensity of the stream of air in the separating chamber in relation to the mixture, with the light materials separated and elevated by such air, and with the heavy materials gravitating from the separating chamber, constitutes a better and more pertinent reference against claims 15, 16, 18 and 19 of plaintiff's U. S. patent No. 3,397,522 than any of the prior art patents relating to air regulating means for adjusting air in the primary duct cited and considered by the Patent Office during the prosecution of the application for plaintiff's patent.

25. The German patent, Gerson No. 453,358 (Def. Exhs. 38, 39), discloses a machine in which the separation of materials of different specific weights (or the separation of green cotton bolls from ripe bolls) is achieved by the use of a secondary or induced air stream, the velocity of which can be regulated by adjustable means positioned on the separating chamber as shown in Herz patent No. 1,850,719 (Def. Exh. 28), and in which the desired materials (or ripe cotton bolls) are then transported to a collecting area by the primary air

stream which induces the secondary air stream in the separating chamber.

Based on the foregoing Findings of Fact, the Court now makes the following:

CONCLUSIONS OF LAW

1. The Court has jurisdiction of the parties and the subject matter of this action (Pre-Trial Order, page 3, stipulation 1).

2. Plaintiff is the owner of U. S. patent No. 3,397,522 (Pre-Trial Order, page 4, stipulation 2).

3. Claims 15, 16, 18 and 19 of plaintiff's U. S. patent No. 3, 397,522 are invalid. (35 U.S.C. §§ 102 and 103).

4. Defendants have not contested plaintiff's charge of infringement of claims 15, 16, 18 and 19 of plaintiff's U. S. patent No. 3,397,522 by the manufacture, use or sale of defendants' Model 24-A cotton harvesters of the type marketed prior to September, 1969; if said claims were valid, therefore, such Model 24-A cotton harvesters would infringe them (Pre-Trial Order, page 4, stipulation 3).

5. The ultimate issue under 35 U.S.C. 103 is one of law. *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equip. Corp.,* 1950, 340 U.S. 147, 71 S.Ct. 127, 95 L.Ed. 162; *Graham* v. *John Deere Co.,* 1966, 383 US. 1, 17, 86 S. Ct. 684, 694, 15 L.Ed. 2d 545, 556; *Swofford* v. *B. & W., Inc.* (5th Cir. 1968), 395 F.2d 362, 368; *Kiva Corp.* v. *Baker Oil Tools, Inc.,* (5th Cir. 1969), 412 F.2d 546, 552.

6. Any unpatentable machine lacking the level of invention required for federal patents and representing too slight an advance to be properly patented belongs to the public and may be followed in every detail at will by whoever pleases regardless of the motives. *Sears, Roebuck & Co.* v. *Stiffel Co.,* 1964, 376 U. S. 225, 11 L.Ed. 2d 661, 84 S.Ct. 784; *Compco Corp.* v. *Day-Bright Lighting, Inc.,* 1964, 376 U.S. 234, 11 L.Ed. 2d 669, 84 S. Ct. 779.

7. To establish invalidity it is not necessary that all of the elements of the combinations of the claims in issue be found in a single prior art patent; it is sufficient to show that the evidence, taken as a whole, discloses that all of the claimed elements are found in different prior art patent. *Zero Mfg. Co.* v. *Mississippi Milk Pro. Ass'n.* (5th Cir. 1966), 358 F.2d 853, 857; *Fairchild* v. *Poe* (5th Cir. 1958), 259 F.2d 329, 332.

8. Whether or not prior art patents have ever been reduced to commercial practice or put to use is wholly irrelevant to the question of whether or not such patents constitute anticipation. *Edward Valves, Inc.* v. *Cameron Iron Works, Inc.* (5th Cir. 1961), 286 F.2d 933, 939; *National Filters, Inc.* v. *Research Products Corp.* (5th Cir. 1967), 384 F.2d 516, 518.

9. The presumption of patent validity provided by 35 U.S.C. 282 is weakened, if not totally destroyed, when, as here, the prior art patents relied on by defendants constitute better and more pertinent references against the claims in issue than those considered by the Patent Office, and the evidence shows that the Patent Office did not have all such relevant art before it when the patent in suit was issued. *Rosaire* v. *Baroid Sales Division* (5th Cir. 1955), 218 F.2d 72, 75; *American Seating Co.* v. *Southwestern Metals Co.* (5th Cir. 1969), 412 F.2d 756, 760.

10. Commercial success is not a substitute for invention, is not sufficient evidence of invention where lack of invention is plain, and does not alone prove non-obviousness. *Mannix Co.* v. *Healey* (5th Cir. 1965), 341 F.2d 1009, 1015; *National Filters, Inc.* v. *Research Products Corp.* (5th Cir. 1967), 384 F.2d 516, 520.

11. Accordingly, judgment will be entered dismissing Plaintiff's suit and declaring claims 15, 16, 18 and 19 of U.S. Letters Patent No. 3,397,522 invalid.

The Clerk will furnish a copy hereof to all attorneys.

Entered this 23rd day of March, 1970.

/s/ Halbert O. Woodward
United States District Judge

IN THE UNITED STATES DISTRICT COURT

For The Northern District of Texas

Lubbock Division

(Caption—Civil Action No. CA-5-662)

JUDGMENT

(Filed Mar. 23 1970)

On the 16th day of March, 1970, there appeared in open Court the Plaintiff through its attorneys and the Defendants by and through their attorneys, and each party announced ready for trial, and a jury was waived by each party, and the testimony, exhibits and evidence were presented to the Court without the intervention of a jury, and the Court, after hearing and considering all of the testimony and the evidence, and having further examined and considered the pleadings on file herein and having heard and considered the arguments of counsel, is of the opinion that judgment should be entered declaring claims 15, 16, 18 and 19 of United States Patent No. 3,397,522, invalid, and further providing that the Plaintiff's suit for alleged infringement be dismissed;

It is accordingly Ordered and Adjudged that the Plaintiff's suit for alleged infringement of claims 15, 16, 18 and 19 of the United States Letters Patent No. 3,397,522 is hereby dismissed for invalidity, and each of said claims 15, 16, 18 and 19 are hereby declared to be invalid.

All costs herein are hereby adjudged and taxed as against the Plaintiff.

The Clerk will furnish a copy hereof to the attorneys for each party.

Entered this the 23rd day of March, 1970.

/s/ Halbert O. Woodward
United States District Judge

APPENDIX E

Aug. 20, 1968 L. F. SANDERSON ET AL 3,397,522

COTTON HARVESTER

Filed July 6, 1965 3 Sheets-Sheet 1

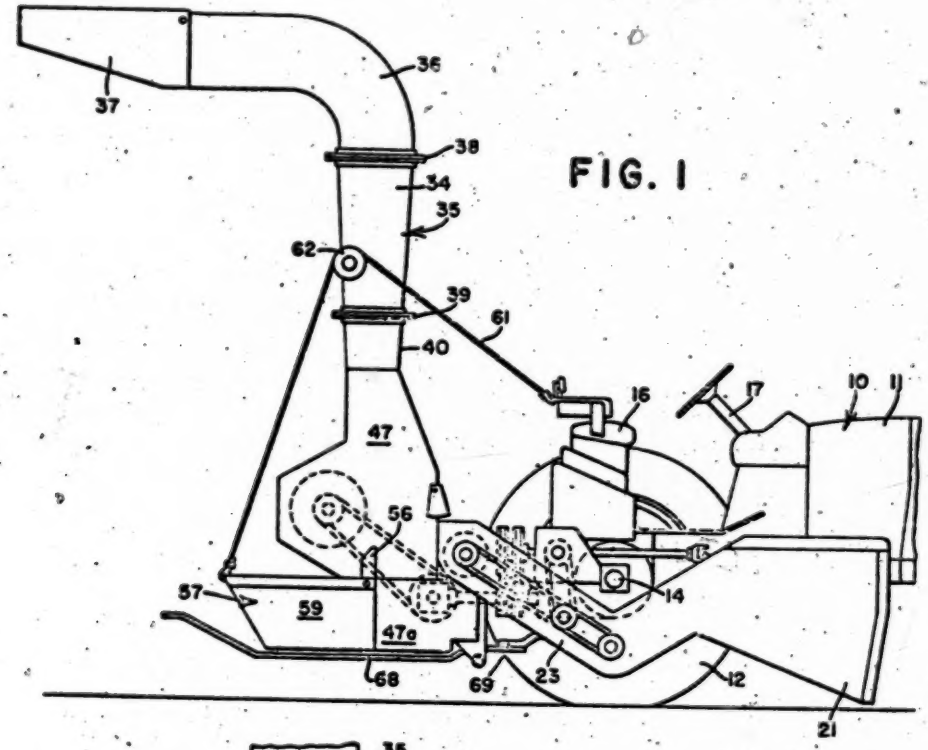

FIG. 1

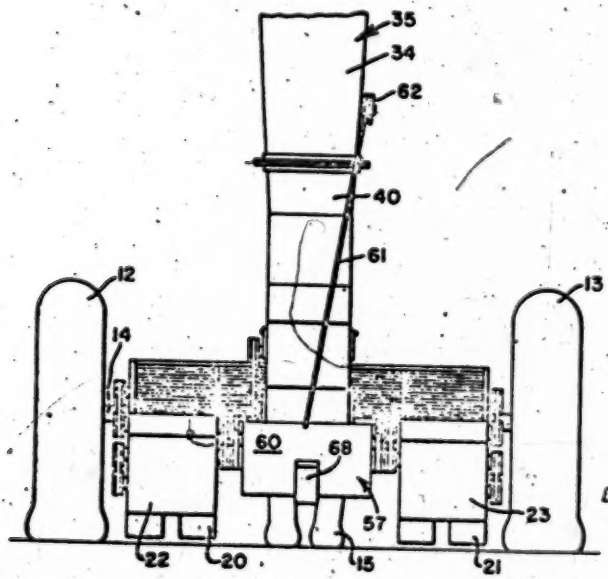

FIG. 2

INVENTORS
L. F. SANDERSON
R. V. HOOK
M. L. McGUIRE
BY William A. Mooney
ATTORNEY

Aug. 20, 1968 L. F. SANDERSON ET AL 3,397,522
COTTON HARVESTER
Filed July 6, 1965 3 Sheets-Sheet 2

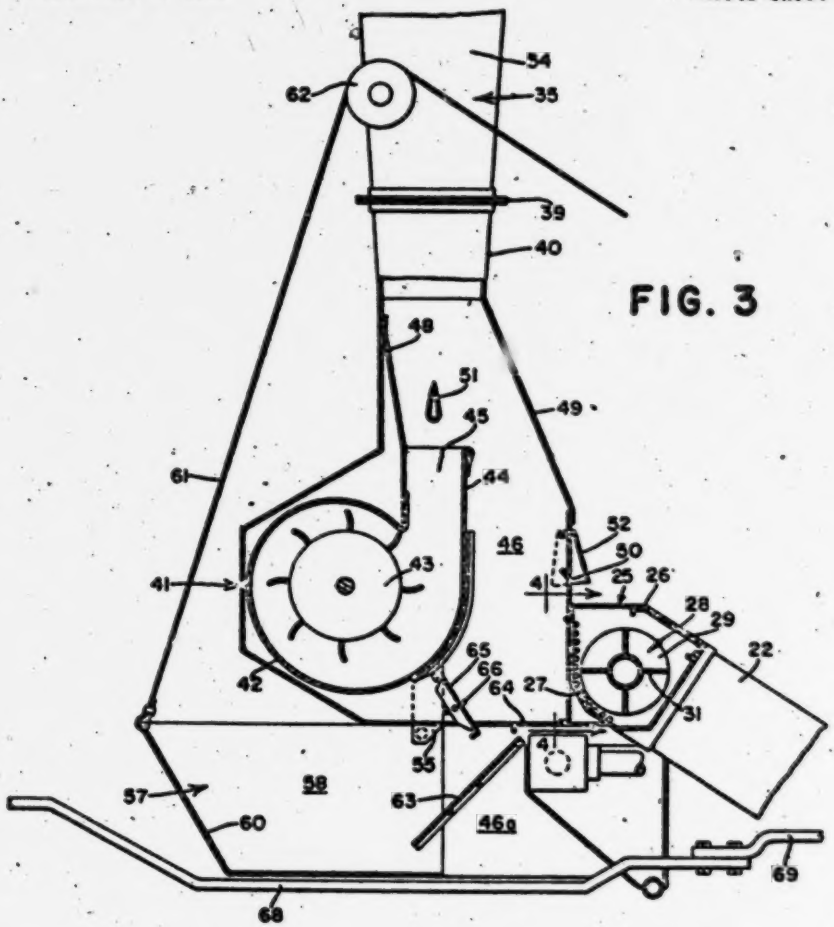

FIG. 3

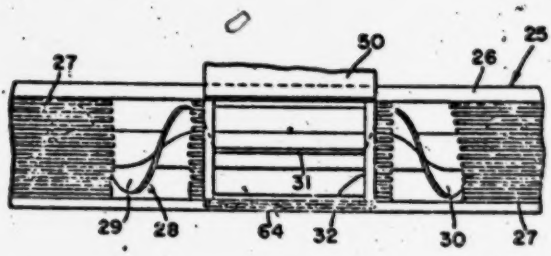

FIG. 4

INVENTORS
L. F. SANDERSON
R. W. HOOK
M. L. McCUNN
BY
William A. Murray
ATTORNEY

Aug. 20, 1968 L. F. SANDERSON ET AL 3,397,522

COTTON HARVESTER

Filed July 6, 1965 3 Sheets-Sheet 3

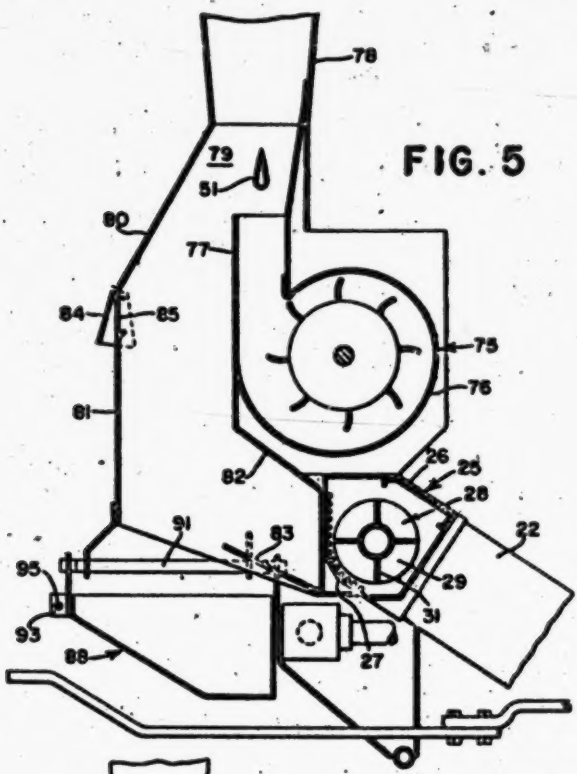

FIG. 5

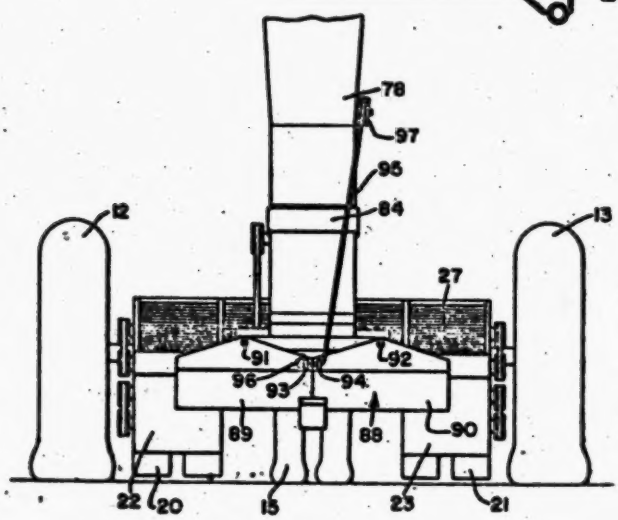

FIG. 6

INVENTORS
L. F. SANDERSON
R. W. HOOK
M. L. Mc CUNN

William A. Murray
ATTORNEY

United States Patent Office

3,397,522

Patented Aug. 20, 1968

3,397,522

COTTON HARVESTER

Leon F. Sanderson and Richard W. Hook, Des Moines, and Myron L. McCann, Dallas Center, Iowa, assignors to Deere & Company, Moline, Ill., a corporation of Delaware

Filed July 6, 1965, Ser. No. 469,484
24 Claims. (Cl. 56—30)

ABSTRACT OF THE DISCLOSURE

A material conveying and separating structure for use on a cotton harvester that includes a chamber that receives a mixture of ripe and green bolls from a cotton harvester, a blower duct extending vertically from the chamber and with a blower directing air through the duct, and a communication duct that extends between the chamber and blower duct that operates to induce or draw the ripe bolls from the chamber.

This invention relates to a cotton harvester and more particularly relates to the discharge conveying mechanism for a cotton harvester.

In a conventional type cotton harvester in which there is provided a pair of row units on opposite sides of a tractor body that harvests and feeds harvested cotton bolls rearwardly to a discharge mechanism at the rear of the tractor, it has been conventional to provide an inclined elevator that feeds the material upwardly and rearwardly to a trailer also being pulled by the tractor. The means of conveyance is normally a flight-type conveyor that moves both ripe and green cotton bolls to the upper discharge end of the elevator. Positioned adjacent the rear discharge end is a blower mechanism that directs a stream of air through the material being discharged from the discharge end so as to drive the ripe or lighter cotton bolls into the trailer and permit the green cotton bolls to pass downwardly to be collected or to fall onto the ground. The problem that exists in this type of discharge is that it is difficult to collect the green cotton bolls and the elevator being inclined requires that the trailer is positioned considerably rearwardly of the tractor. Further, there is inefficiency in this method of discharge since the entire combination of ripe and green cotton bolls is moved through the entire cycle of harvesting and conveying and is separated only at the point of discharge of the elevator.

With the above in mind, it is the primary object of the present invention and consequently the present invention relates to a means of discharging cotton from a cotton harvester that includes a vertically disposed discharge duct having an upper swivel-type laterally extending discharge spout and a blower at the base of the discharge duct that directs a primary stream of air along the principal axis of the duct and towards the discharge spout. In combination with this type of discharge there is provided a transverse horizontal auger conveyor that receives and transfers material from the opposite row units on the tractor and moves the commingled ripe and green cotton bolls centrally inwardly to a paddle mechanism that drives the mixture of materials in a lateral rearward stream. A duct extension opens downwardly into the stream of commingled materials and extends therefrom upwardly and opens into the base of the vertical duct above the blower discharge and to one side of the discharge. Positioned beneath the stream of materials is a green boll catching container that opens upwardly into the stream. The high pressure of the primary stream of air induces a secondary stream of air in the duct extension. The induced secondary stream of air draws the ripe cotton bolls upwardly into the base of the duct and from thence the bolls are driven upwardly and outwardly to a trailer. The heavier or green bolls are permitted to gravitate into the green boll container.

Another object of the invention is to provide an adjustable air inlet in the duct extension above the stream of commingled ripe and green bolls to thereby regulate the separation between the ripe and green bolls.

Other objects and advantages of the invention will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is a side view of a harvester incorporating the present discharge conveyances and including a portion of a tractor.

FIG. 2 is a rear view of the combination tractor and harvester.

FIG. 3 is an enlarged vertical sectional view through a portion of the discharge conveying mechanism.

FIG. 4 is a sectional view taken substantially along the line 4—4 of FIG. 3.

FIG. 5 is a sectional view similar to FIG. 3 but showing a slight modification in the form of the invention.

FIG. 6 is a view similar to FIG. 2 but showing the modification of the invention.

A cotton harvester herein to be described is supported on a main support or tractor 10 having a fore-and-aft extending body 11 and carried at its rear on rear traction wheels 12, 13 on opposite ends of a transverse axle structure 14. The tractor body is supported at its forward end by front steerable wheels 15. An operator's station, as indicated by a seat 16 and steering wheel 17, is provided on the tractor body 11.

The harvester is composed of a pair of row units 20, 21 positioned on opposite sides of the tractor body 11 and forwardly of the axle structure 14. The harvesting row units may be of any of many conventional units. In this respect, U.S. Patent 2,533,510 which issued to M. W. Roscoe Dec. 12, 1950 shows and describes one of the more popular types of harvesters now on the market. Generally the harvester is composed of a forward harvesting mechanism disposed forwardly of the traction wheels 12, 13 that contacts the cotton plants and dislodges the cotton bolls from the plants. The cotton bolls are then transferred into a cleaning mechanism on the side of the harvesting mechanism and dispatched rearwardly to a pair of elevators 22, 23 extending from lower intake ends beneath the axle structure 14 upwardly and rearwardly to a pair of transversely spaced discharge ends rearwardly of the traction wheels.

A transverse auger structure 25 extends between the discharge ends of the elevators 22, 23 and includes an auger housing having a front and overhead closed portion 26 and a rear underlying grille portion 27, the latter forming with the housing portion 26 a transverse tube for receiving an auger device 28. The auger device 28 includes a pair of spiral helical flightings 29, 30 that feeds material from the discharge ends of the elevators 22, 23 to a central impeller portion 31. The impeller 31 is composed of a series of radial paddles that receives the cotton from the helical flightings 29, 30 and drives it rearwardly through a centrally located rear outlet 32.

Positioned rearwardly of the transverse auger structure 25 and directly in line with the outlet 32 is an upright cotton conveying mechanism including a vertical duct structure 35 having at its upper end an elbow 36 for directing material horizontally rearwardly through a discharge spout 37. The duct structure 35 includes upper and lower junctures 38, 39 at opposite ends of a central upright portion 34 that may be adjusted so that the elbow 36 and spout 37 may be directed forwardly, rearwardly, or to the sides. In many cotton harvesters there is provided a cotton receiving basket in an overhead relation

to the tractor 10 and consequently it is desired to have the duct structure convertible for either this type of cotton basket or for discharging into a trailer. The portion 34 diverges outwardly in respect to the duct axis from the lower juncture 39. Continuing downwardly from the juncture 39 is a short vertical conveying section 40. The lower portion 40 may be treated as the base of the vertical duct structure 35. Provided beneath the base 40 of the duct structure 35 is a blower 41 having a housing 42 fixed to the vehicle slightly above and rearwardly of the outlet 32. Contained within the housing 42 is a horizontal rotor or fan member 43 that directs a stream of air through a vertical discharge duct or nozzle 44 terminating at an upwardly opening discharge 45. The discharge duct 44 is axially aligned and is located centrally in respect to the cross section of the duct structure 35 and is considerably smaller in cross section. The duct nozzle 44 directs the air upwardly substantially on the primary axis of the duct structure 35. The duct portions 34, 40 diverge above the nozzle opening 45 to accommodate the expanding air stream above the opening.

The base 40 of the duct structure 35 and the blower housing 42 have common side panels 46, 47 at the entire lower portion of the conveying mechanism. Extending between the side panels 46, 47 and continuing downwardly from the base 40 of the conduit structure 35 is a pair of downwardly and forwardly inclined panels 48, 49. The panel 48 continues downwardly and forwardly from the rear side of the base 40 to the upper rear edge of the conduit 44. The inclined panel 49 extends forwardly of the conduit 44 and has its rear under surface forming with the upper forward edge of the conduit 44 an inlet into the base 40 of the conduit above and to the forward side of the blower outlet 45. A vertical panel 50 extends downwardly from the lower edge of the inclined panel 49 to the overhead portion 25 of the transverse conveyor structure 25. The panels 49 and 50 form, therefore, with the forward upright panel of the housing 42 a vertical duct extension or chamber that opens into the base 40 of the duct structure 35. The chamber or duct extension opens downwardly into and receives the stream of material being discharged laterally rearwardly by the paddle members 31 through the outlet 32. The extension or chamber serves as communicating means and operates to draw the ripened cotton bolls upwardly through the extension or chamber into the base 40 of the duct structure. The chamber or duct extension includes, therefore, a vertical portion between the panel 50 and the forward side of the housing 42 and an upward and rearwardly inclined portion formed between the panel 49 and the upper and forward wall of the duct 44, the latter inclined portion opening as a ripe boll outlet, as previously mentioned, into the base 40 of the duct structure 35 above and to the side of the outlet 45. A noise muffling member 51 extends between the walls 46, 47 above the opening 45 and tends to deviate the movement of air to reduce the hum or roar of the air moving through the duct structure 35. A baffle member 52 is pivoted on the wall 50. It is between the material outlet 32 and nozzle opening 45. By adjusting the baffle 52 the amount and velocity of air moving through the duct extension may be regulated.

A pair of upright brackets 55, 56 is fixed to the respective sides 46, 47 and has lower ends depending beneath the lower edges of the sides. Pivotally mounted on the lower ends of the brackets 53, 56 is a green boll catcher or container 57 composed of a pair of upright sides 58, 59 that lie alongside the brackets 55, 56 and are pivotally connected thereto at their forward upper edges. The sides 58, 59 are interconnected by a panel 60 at their lower edges and rear edges respectively. A cable 61 is connected to the upper edge of the panel 60 and extends upwardly over a pulley 62 to a forward or remote end connected to the seat 16. The container 57 opens forwardly. At the forward end of the container 57 and extending between downward extensions 46a, 47a of the sides 46, 47 is a panel 63 inclined downwardly and rearwardly. A horizontal panel 64 extends rearwardly from the under edge of the outlet 32 to a rear edge spaced forwardly from the surface of an inclined transverse baffle member 65 that may be adjusted in an angular slot 66. As may be readily apparent from viewing FIG. 3, the opening or green boll outlet defined by the rear edge of the panel 64 and the forward surface of the baffle 65 underlies the stream of laterally rearwardly directed material being thrown by the paddles 31 and permits the heavier bolls to gravitate onto the inclined panel 63 and from thence into the green boll catcher 57. The adjustability of the panel 65 serves to determine the size of the opening so as to regulate the amount of air moving through the lower portion of the duct. Since separation of the ripe from the green bolls may occur in this area it may be considered as a separating chamber.

Positioned beneath the container 57 is a drawbar extension 68 connected at its forward end to a tractor drawbar 69 mounted on the tractor 10. The rear end of the drawbar extension 68 may be connected to a suitable trailer. It should also be noted that the cable 61 may operate to lift the container 57 without interference with the drawbar extension 68.

There has thus been described an apparatus that receives and conveys cotton bolls from a cotton harvester which comprises a transverse auger structure that receives harvested bolls from a pair of harvesting row units and moves the bolls inwardly to a central outlet 32 that opens rearwardly. The auger flights 29, 30 move the material inwardly to radial paddles 31 that drive the cotton bolls in a lateral rearward stream into a blower-conveyor. The conveyor is composed of an upright or vertical duct system 35 having a base 40 for receiving the cotton bolls and further includes a blower 41 with a vertical discharge conduit or nozzle 44 beneath the base 40 and centrally located relative to the cross section of the base 40 and directs a high velocity stream of air axially in respect to the duct structure 35. The duct extension, composed of the panels 49, 50 and the forward panel of the housing 42, is offset to one side of the nozzle 44 and opens downwardly into the stream of materials leaving the outlet 32. The differential in pressure between the primary stream of air and the surrounding area induces air movement upwardly in the extension and guides the ripe bolls upwardly into the duct structure 35 with entrance therein at a point above the outlet 45 and to one side of the outlet. The ripe bolls then enter the main stream of air and are driven through the duct structure 35, the elbow 36, and spout 37. The amount of air bled through the opening at the baffle 52 controls the air velocity beneath the baffle and thereby regulates the separation of the ripe and green bolls. The green boll container 57 is disposed beneath the stream and opens upwardly to gather the green cotton bolls and other heavier material gravitating through the stream. The container 57 may be emptied by an operator on the seat 16 pulling on the cable or rope 61 so as to raise the rear end of the container 57 and tilt the container downwardly so that material is discharged over the forward edge of the container. Upon slack being applied in the line 61, gravity will return the container 57 to its horizontal or boll-catching position.

In the form of the invention shown in FIGS. 5 and 6, a blower 75 is positioned directly above the transverse housing structure 26 and is supported thereon. The blower 75 includes a blower housing 76 having a vertical discharge conduit or nozzle 77 centrally located relative to the lower or base end of a diverging vertical discharge duct 78. The duct 78 and blower 75 have common vertically extending sides 79. A duct extension is positioned rearwardly of the housing 76 and conduit 77 and includes an upper downwardly and rearwardly inclined transverse wall 80 and a vertical lower wall 81 extending downwardly from the lower end of the inclined wall 80. Both walls 80, 81 are spaced rearwardly of the conduit 77 in

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the housing 76. A panel means 82 is forwardly opposite the vertical wall 81 and has an inclined portion that extends rearwardly from the outlet 32 of the transverse housing structure 26. An inclined under panel 83 is provided opposite the inclined portion of the panel 82 and generally guides the stream of material being discharged by the central paddle portion 31 of the transverse conveyor rearwardly. The primary stream of air leaving the nozzle 77 induces a secondary stream of air in the vertical portion of the duct extension, as defined by the rear wall 81 and the rear panel of the housing 76 and partially by the panel 82. The duct extension opens downwardly into the stream of material for the purpose of sucking or drawing the ripe cotton bolls upwardly into the secondary stream of air. The inclined panel 80 is spaced rearwardly of the upper discharge edge of the conduit 77 and forms an inclined portion of the duct extension that opens into the base 78 of the duct rearwardly of and above the discharge of the conduit 77. Pivotally mounted on the side walls 79 is a baffle member 84 positioned over an opening 85 in the rear panel 81. The baffle 84 may be adjusted to open or close the opening 85 and to thereby control the degree or amount of suction created in the duct extension and thereby the separation of the ripe bolls from the commingled stream of ripe and green bolls.

The edge of the panel 83 is spaced from the forward side of the wall 81 and describes therewith a discharge outlet that permits the heavier green bolls and other heavier material to gravitate into a bowl or container 88. The container 88 is composed of two complementary portions 89, 90 having front and rear upright sides pivoted on fore-and-aft extending pivot rods 91, 92. As may be seen from viewing FIG. 6, the container portions 89, 90 are separable along a vertical fore-and-aft extending plane substantially on the fore-and-aft center line of the tractor. A pair of brackets 93, 94 project rearwardly from the rear wall of the respective portions 89, 90 and are suitably apertured so as to receive a line or rope 95. The rope has a knot 96 at the end passing through the apertures and extends therefrom upwardly over a pulley 97 that redirects the line for connection to the tractor seat 16. When it is desired to dump or discharge the green bolls in the container 88, slack is played into the rope 95 and the gravitational effect of the containers and the material in the containers will cause the central or inner portions of the container portions 89, 90 to tilt or to dump the material. When it is desired to again place the portions 89, 90 in transverse horizontal aligoment, tension is applied in the rope 95 and the two sections move into the desired position.

Thus in the modified form of the invention there has been described a material conveying means that includes a blower 75 supported directly over the transverse auger structure 25 and having a discharge conduit 77 directed upwardly centrally and axially into the duct 78. The duct extension is disposed rearwardly of the conduit 77 and opens downwardly into the stream of materials leaving the transverse conveyor 25 and moves the material upwardly to be introduced into the base 78 of the duct above and to one side of the discharge end of the conduit 77.

In both forms of the invention there has thus been described apparatus that includes a boll catcher or container that is pivotally mounted on the conveying structure to be tilted so that material may be discharged therefrom. In both forms of the invention the container is operated by a cable that extends to a remote position, in the present instance the operator's station on the tractor, and operates to position the container between the dump and material receiving positions.

While only two forms of the invention have been shown, it should be recognized that other forms and variations will occur to those skilled in the art. Therefore while the preferred forms have been shown and described for the purpose of clearly and concisely illustrating the principles of the invention, it should be understood that there is no

intention to limit or narrow the invention beyond the broad concepts set forth in the appended claims.

What is claimed is:

1. A discharge conveying structure for a vehicle-mounted cotton harvester, comprising: a cotton receiving transverse auger structure including a transverse housing supported on the vehicle and having an outlet; auger means within the housing for driving material to the outlet and a material impelling portion moving material in a lateral stream through the outlet; a discharge conveyor including a discharge duct with an intake end, and a blower having a blower discharge located adjacent the intake end to direct a primary stream of air through the duct, the blower discharge being offset from the outlet; and a duct extension extending from the transverse housing outlet to the duct and opening into the duct downstream of the blower discharge to thereby induce a secondary stream of air through the extension.

2. The invention set forth in claim 1 further characterized by a material container supported on the vehicle in underlying relation to and in communication with said duct extension adjacent said housing outlet for gathering heavy particles gravitating from the stream.

3. The invention set forth in claim 1 in which the blower has a vertical discharge conduit axially coextensive with the primary axis of the duct and substantially smaller in cross section than the duct.

4. The invention set forth in claim 3 in which the duct extension opens into the base of the duct offset to one side of the conduit and above the mouth of the conduit discharge.

5. The invention set forth in claim 1 further characterized by an adjustable opening in the duct extension above the outlet and between the outlet and intake end of the duct for regulating the effectiveness of the secondary stream in respect to the materials moving in the stream of materials.

6. The invention set forth in claim 1 in which the blower is supported on the vehicle above the transverse housing and has a vertical discharge conduit terminating in the blower discharge; and the duct extension is composed of a lower vertical portion alongside the conduit and an upper portion at least partially above the conduit and inclined toward and opening into the duct above the blower discharge.

7. The invention set forth in claim 1 in which the blower is supported on the vehicle above the transverse housing and has a vertical discharge conduit terminating in the blower discharge; and the duct extension is composed of a lower vertical portion rearward and alongside the conduit and an upper portion at least partially above the conduit and inclined forwardly toward and opening into the duct above the blower discharge.

8. The invention set forth in claim 1 in which the duct is rearwardly offset from the outlet and the blower is supported on the vehicle and has a vertical discharge conduit rearwardly of the outlet and terminating in the blower discharge; and the duct extension is composed of a lower vertical portion alongside the conduit and an upper portion at least partially above the conduit and inclined toward and opening into the duct above the blower discharge.

9. The invention set forth in claim 2 in which the container is pivotally supported on the vehicle to move between a tilted position for discharging the material and a non-tilted position for retaining the material.

10. The invention set forth in claim 9 in which the container is an upwardly opening box-like structure composed of two transversely coextensive complementary parts and each part is supported on a fore-and-aft extending pivot whereby the parts may tilt downwardly for discharging the material.

11. The invention set forth in claim 9 further characterized by a control element operable from a remote

area and connected to the container for effecting position thereof.

12. A cotton harvester adapted to be supported on a mobile vehicle having an elongated fore-and-aft extending body supported on traction wheels spaced from the body, comprising: a pair of fore-and-aft extending row units supported on the vehicle on opposite sides of the body and forward of the traction wheels and including a pair of fore-and-aft extending conveyers disposed between the wheels and body and having a pair of transversely spaced discharge ends rearwardly of the traction wheels; a transverse auger structure extending between the discharge ends including a transverse housing supported on the vehicle rearwardly of the traction wheels and including a central outlet opening rearwardly; auger means within the housing for driving material inwardly from the discharge ends to the outlet and including a central material impelling portion for moving material through the outlet; a discharge conveyor including a vertical duct; a blower at the base of the duct having a blower discharge located for directing air axially upwardly in the duct, the blower discharge being vertically offset above the central outlet; and a vertical duct extension extending upwardly from said housing adjacent the central outlet to the base of the duct and opening into the duct beyond the blower discharge.

13. A cotton harvester adapted to be supported on a mobile vehicle having an elongated fore-and-aft extending body supported on traction wheels spaced from the body, comprising: a pair of fore-and-aft extending row units supported on the vehicle on opposite sides of the body and forward of the traction wheels and including a pair of fore-and-aft extending conveyors disposed between the wheels and body and having a pair of transversely spaced discharge ends rearwardly of the traction wheels; a transverse auger structure extending between the discharge ends including a transverse housing supported on the vehicle rearwardly of the traction wheels and including a central outlet opening rearwardly; auger means within the housing for driving material inwardly from the discharge ends to the outlet and including a central material impelling portion for moving material in a lateral rearward stream through the outlet; a discharge conveyor including a vertical duct offset rearwardly of the outlet; a blower at the base of the duct having a vertical blower discharge conduit located centrally in respect to the cross section of the duct and directing air upwardly along the primary axis of the duct; and a vertical duct extension extending upwardly from said housing adjacent the central outlet to the base of the duct and opening into the duct above and to a side of the conduit.

14. A discharge conveying structure for a vehicle-mounted cotton harvester having a material outlet and a material impelling means for moving material in a stream through the outlet, the conveying structure comprising a discharge conveyor including a vertical duct and a blower at the base of the duct having a blower discharge located in respect to the duct for directing air axially upwardly of the duct, the blower discharge being offset from the outlet; a duct extension extending from the housing adjacent the outlet to the duct and opening into the duct adjacent the base; and a container supported on the vehicle beneath the outlet so as to underlie the stream of material and opening upwardly to receive the heavier material gravitating from the stream.

15. A discharge conveying and separating mechanism for use with a cotton harvester having discharge means in which cotton is discharged in a commingled mixture of ripe and green bolls, comprising: a separating chamber in material receiving relation to the discharge means for receiving the mixture; a duct structure projecting from the chamber and having an intake end offset from the chamber; a blower having an outlet directed into the intake end of the duct directing a primary stream of air through the duct; communicating means between the separating chamber and duct opening into the duct whereby the primary stream of air will induce a secondary stream of air in the chamber for drawing the ripe bolls from the mixture and moving them into the duct; and air regulating means on the separating chamber for effecting the intensity of the secondary stream in relation to the mixture.

16. The invention defined in claim 15 in which the duct is vertically disposed, the separating chamber is at the base thereof, the blower outlet is directed upwardly, and the communicating means is an opening between the chamber and duct above the blower outlet.

17. The invention defined in claim 15 further characterized by a sound suppressing member disposed within the duct adjacent to the blower outlet and in the path of the primary stream.

18. The invention defined in claim 16 in which the blower outlet and the opening of the communicating means open into the duct and are closely adjacent to one another with one being substantially on the main axis of the duct and the other being offset from the axis and adjacent said one outlet.

19. The invention defined in claim 15 in which the primary stream of air is introduced into the duct through the blower outlet and is directed along the primary axis of the duct and the opening of the communicating means into the duct is offset from the axis.

20. The invention defined in claim 15 further characterized by the main duct having walls diverging downstream in relation to the blower outlet.

21. A discharge conveying structure for a vehicle-mounted cotton harvester, comprising: a cotton receiving transverse auger structure including a transverse housing supported on the vehicle and having an outlet opening rearwardly; auger means within the housing for driving material to the outlet and a material impelling portion moving material in a lateral rearward stream through the outlet; a discharge conveyor including a vertical duct and a blower disposed to direct air upwardly into the base of the duct and having a blower discharge located in respect to the cross section of the duct to direct air upwardly along the primary axis of the duct, the blower discharge being vertically offset above the outlet; a vertical duct extension adapted to receive the lateral stream of material issuing from the outlet and extending therefrom upwardly to open into the base of the duct above and to a side of the blower discharge; and a material container beneath the duct extension and in communication therewith for catching gravitating material.

22. A conveying and separating structure for use with a cotton harvester having a main support and harvesting mechanism thereon adapted to harvest both ripe and green cotton bolls and having discharge means for discharging them in a commingled mixture of ripe and green bolls comprising: a container carried on the support and disposed to receive cotton bolls from the discharge means; a blower carried by the support and having an outlet offset from and directed away from the container; a conveying duct carried by the support and extending from the outlet in a downstream relation thereto whereby air will move from the outlet through the duct; and an extension duct opening into and extending from the conveying duct to a material intake end adjacent the discharge means whereby air flow may be induced into the extension duct by air flowing through the main duct to thereby draw off the ripe bolls from the ripe and green boll mixture and move the ripe bolls into the conveying duct while permitting the green bolls to be deposited in the container.

23. A discharge conveying and separating mechanism for use with a cotton harvester with discharge means discharging in a stream a commingled mixture of ripe and green cotton bolls comprising: a chamber in communication with the discharge means and having an upper ripe boll outlet and a lower green boll outlet; and upwardly extending conveyor duct having a base in com-

munication with the upper outlet; a blower having a blower discharge in communication with the base of the duct and for directing air upwardly through the duct and to thereby effect an induced air flow through the chamber and upper outlet; and a material container beneath and in communication with the lower outlet for receiving green cotton bolls.

24. The invention defined in claim 23 in which the blower duct is vertical and has an elbow at its upper end with a horizontal extension that directs the cotton into a ripe boll container.

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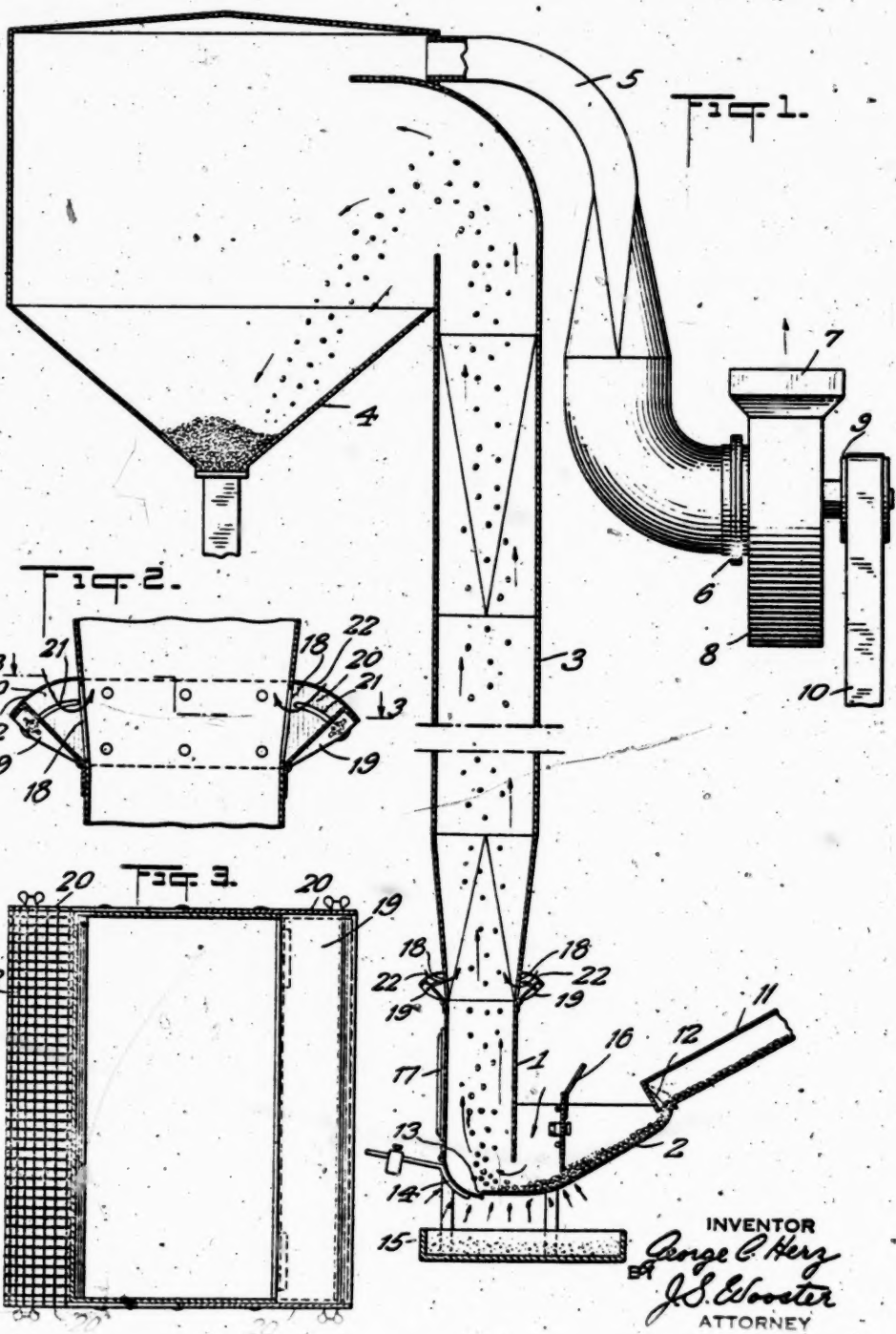
RUSSELL R. KINSEY, *Primary Examiner.*

APPENDIX F

March 22, 1932. G. C. HERZ 1,850,719

APPARATUS FOR CLEANING COFFEE, COCOA BEANS, ETC

Filed Dec. 16, 1929 2 Sheets-Sheet 1



INVENTOR
George C. Herz
BY
J. S. Wooster
ATTORNEY

March 22, 1932. G. C. HERZ 1,850,719

APPARATUS FOR CLEANING COFFEE, COCOA BEANS, ETC

Filed Dec. 16, 1929 2 Sheets-Sheet 2

Fig. 4.

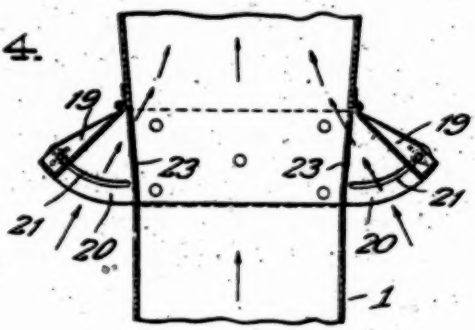


Fig. 5.

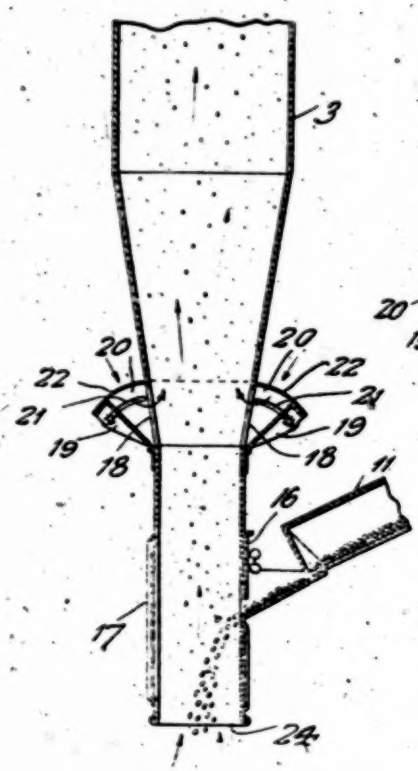
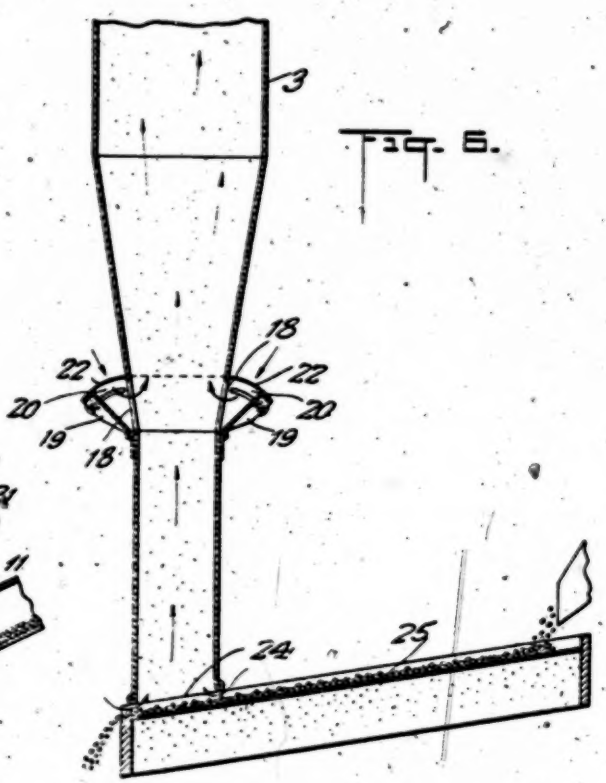


Fig. 6.



INVENTOR
George C. Herz
BY
J. S. Webster
ATTORNEY

Patented Mar. 22, 1932 1,850,719

UNITED STATES PATENT OFFICE

GEORGE C. KERR, OF FLUSHING, NEW YORK, ASSIGNOR TO JABEZ BURNS & SONS, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

APPARATUS FOR CLEANING COFFEE, COCOA BEANS, ETC.

Application filed December 16, 1929. Serial No. 414,421.

This invention relates to apparatus for cleaning coffee, cocoa beans, peanuts, grains and other similar goods either green or roasted, in their whole, cracked, granulated or ground state as such cleaning may be necessary or can best be accomplished. It particularly relates to apparatus employing air to separate the goods from comparatively heavier, that is denser, materials such as stones, nails, etc., or from comparatively lighter, that is less dense, materials such as hulls, chaff, shells, skins, etc.

Inasmuch as the separation of the materials by air involves consideration both of the weight of the material and its surface area, I have made use of the expression "density" to denote weight of the substance per unit surface area.

Certain products such as green coffee, raw shelled peanuts, etc., are very nearly the same density as the foreign materials to be removed. It is therefore customary to clean these products in the roasted state since they are then comparatively lighter, that is less dense, than in the green or raw state. Cocoa beans, on account of their large size, can usually be cleaned in the raw state.

As the objects to be attained and the methods employed are similar for the various separations to be made, I shall refer particularly to apparatus used for what is generally known as stoning roasted coffee, that is a separation from roasted coffee beans of such materials as stones, nails and other foreign materials of a denser composition.

Much of the foreign materials found in coffee beans is approximately the same size as the beans and therefore cannot be removed by sifting. Therefore it is customary to use air to separate the beans from the foreign matter. The usual air separator consists of a vertical pipe in which an upward current of air is produced by an exhaust fan. The goods are fed in at the lower end which is known as the boot, and the air is so regulated that it lifts the beans but leaves the denser foreign matter behind. The intermediate section known as the riser terminates in a hopper at the upper end designed to receive the beans and separate them from the rapidly moving air.

The principal objects of the invention are to control the amounts of air used, first, in the separating section of the apparatus, or boot, and second, in the elevating section, or riser; so that the cleaning or separating operations are speeded up, and the capacity thereby increased, the quality of the cleaning is vastly improved over that obtained with present apparatus, and the power required by the exhaust fan which furnishes the air is much reduced.

More air is required to carry a given amount of coffee up through the riser pipe to the hopper than is needed to lift that amount of coffee from the stoner boot to the riser pipe. In existing types of stoners, all the air required to separate the coffee in the boot and carry it up through the riser pipe to the hopper is taken in through the stoner boot. In such devices the quality of the stoning suffers because a higher velocity is used during the separation of the foreign materials than is necessary to lift the coffee from the boot to the riser. It is obvious that the higher the air velocity the larger and denser the foreign materials that will be lifted along with the coffee.

In order to maintain a high rate of coffee flow and a high quality of stoning this invention enables air to be admitted between the stoner boot and the riser. The amount of air admitted is such as to just make up the difference between the air requirements of the boot and the riser for the amount of coffee to be handled. These air requirements are determined by watching the weighing action in the boot. When the coffee is fed to the stoner at a certain rate of flow, a gate on the inlet of the exhaust fan and openings provided between the boot and the riser are so adjusted as to give the minimum air flows in the boot and riser respectively that will carry the required rate of coffee flow. This is exactly the adjustment for highest stoning quality and minimum power input to the fan.

Novel means are provided for varying the openings between the bot and the riser to

permit the rapid and accurate regulation of the air.

The invention will be described in connection with the accompanying drawings in which:

Fig. 1 is a vertical section through an air separator embodying the invention;

Fig. 2 is an enlarged vertical section through the adjustable openings for admitting air at a point between the boot and the riser;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2;

Fig. 4 is a vertical section showing a modified form of adjustable air inlet;

Fig. 5 is a vertical section through a device adapted for removing chaff or other light material from granulated coffee, etc.; and

Fig. 6 is a similar view showing a modified arrangement for feeding the material to the apparatus.

Referring to Fig. 1, the separator comprises a boot 1 having a screen bottom 2 for receiving the goods to be cleaned, a riser 3 substantially higher than the boot, hopper 4, exhaust main 5, adjustable gate 6, air discharge pipe 7, and exhaust fan indicated generally at 8 and operated by pulley 9 and belt 10 driven from any suitable source of power.

The goods to be cleaned are fed to the boot by a pipe or chute 11 having an adjustable gate 12 to regulate the flow of material to the boot. An opening 13 is provided in the bottom of the boot and is normally closed by a hinged door 14 by means of which foreign material left in the boot may be dumped into the waste pan 15. The adjustable gate 16 in the boot may be positioned to spread the goods evenly over the bottom of the boot and produce a uniformly distributed flow. A sight glass 17 is provided in one side of the boot to permit observation of the weighing action which takes place.

The boot 1 is preferably rectangular in cross section and the riser 3 is usually a round pipe, the connection between them being tapered to prevent disturbance of the air currents as much as possible.

In order to increase the capacity and effect a more thorough separation between the beans and the foreign material, I provide an opening between the boot and the riser at a substantial distance above the point at which the goods are fed into the boot. In the preferred form shown in Figs. 1 to 3, air inlet openings 18 are provided in opposite sides, preferably extending across the full width of the pipe and the amount of air to be admitted to the bottom of the riser 3 is determined by the position of flaps 19. To control the position of the flaps, flap guides 20 are provided at each end of each opening 18, and the flaps are hinged between the flap guides and provided with wing nuts cooperating with arcuate slots 21 in the flap guides. Wire cloth screens 22 are placed over the flap guides 20 to prevent escape of any of the product.

In the operation of the apparatus, the flaps 19 are first closed and the gate 6 on the inlet of the exhaust fan is adjusted so that the amount of air passing up the riser is sufficient to lift all the beans into the hopper at the desired rate of coffee flow. With such adjustment, some of the smaller or less dense foreign materials would be carried up with the beans. To prevent this, the weighing action which takes place in the space intermediate the lower opening in the boot and the openings 18 is watched through the sight glass 17 and flaps 19 adjusted to admit air at this point, thus reducing the amount of air passing up the boot until it is the minimum amount that will lift all the beans without lifting the foreign matter. Since, in the preferred form of the invention, the openings 18 extend substantially the full distance across the weighing portion of the pipe, on opposite sides thereof, the additional air will be admitted with as little velocity as possible and as uniformly as possible, thus preventing eddy currents from being set up. The weighing action taking place in the boot can be clearly perceived through the sight glass 17.

Heretofore, any increase in the amount of air in a separator of this type would cause a corresponding increase in the boot as well as in the riser, making it impossible to lift the beans without also lifting smaller or less dense foreign material; and if the amount of air was reduced below a certain point, the beans would fall back into the boot and clog it.

Another modification of the invention is to place the flaps 19 upside-down, that is, hinge them at the top instead of at the bottom, this modification being shown in Fig. 4. This permits of easy entrance of the additional amount of air required as the air does not have to change its direction to the extent that it does in the form shown in Figs. 1 to 3. In this form of the invention wire screens 23 are secured directly over the air inlet openings 18.

The invention as outlined above permits of an accurate separation of a product such as roasted coffee from denser foreign matter such as stones, nails, etc. It is evident that it is equally valuable in separating a product from less dense foreign material and in this case the comparatively lighter material is lifted in the boot, the denser product remaining below. For instance, loose chaff and hulls can be separated from roasted coffee beans; loose hulls and shells from raw cocoa beans; chaff can be separated from roasted granulated coffee; shells can be separated from roasted cracked cocoa beans, etc. In each of these cases the less dense foreign ma-

terial is lifted in the boot, the product passing through the opening in the bottom into a container or bin or conveyor, or otherwise disposed of.

This modification is shown in Fig. 5, in which the lower portion of the boot is extended below the point at which goods are fed to it and the bottom 24 left open so that the denser product falls into a bin or receptacle or other receiver. The amount of extension of the boot below the feed point is affected by the accuracy of the weighing action required and by the particular product being treated.

Another modification is shown in Fig. 6, in which the product is passed below the open lower end 24 of the boot by a shaking inclined blank sheet or perforated sieve 25, or by a perforated or unperforated traveling belt or other similar means. The position of the lower end of the boot is adjustable with relation to the means conveying the product. As the latter passes under the boot, the air passing upward through the boot lifts the less dense foreign material, the product passing on. The amount of air required to remove the foreign material can be very accurately regulated by adjusting the openings by means of the flaps 19.

It will be apparent that the invention is capable of various modifications and adaptations without departing from the scope and spirit of the invention as defined in the appended claims.

The invention claimed is:

1. Apparatus for separating materials of different densities comprising an air pipe having a feed opening adapted to receive the materials to be separated, means for drawing air upwardly through said pipe to lift materials therein, and air inlet openings in opposite sides of the pipe at a substantial distance above the feed opening and extending substantially the full width of the pipe.

2. Apparatus for separating materials of different densities comprising an air pipe having a lower boot portion and an upper riser portion, means to feed the material to be separated to the lower portion, means to draw air upwardly through said portions, said drawing means drawing sufficient air through said upper portion to move the material therethrough, and means between said upper and lower portions to admit air to the bottom of the upper portion, whereby to reduce the flow of air through said lower portion to substantially the exact amount necessary to separate and lift the material of the desired low density.

3. Apparatus for separating materials of different densities comprising an air pipe including a lower boot portion and an upper riser portion substantially higher than said boot portion, means for feeding materials to be separated to said boot portion, means to draw air upwardly through said pipe, and means adjacent the juncture of said boot and riser portion to admit air to said pipe whereby to reduce the flow of air in said boot portion relatively to the flow in said riser portion.

4. In an apparatus as claimed in claim 2, said air admitting means comprising air inlet openings located on opposite sides of said pipe.

Signed at New York, in the county of New York and State of New York, this 13th day of December, A. D. 1929.

GEORGE C. HERZ.

APPENDIX G

Nov. 1, 1932. C. HARAZIN 1,885,437

COTTON ELEVATOR

Filed May 11, 1931

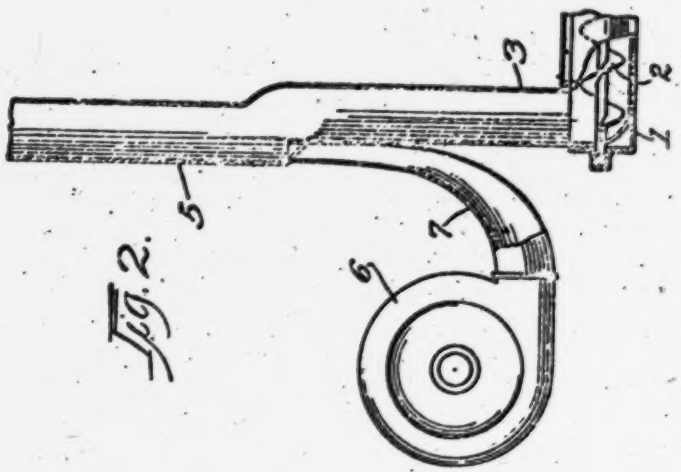


Fig. 2.

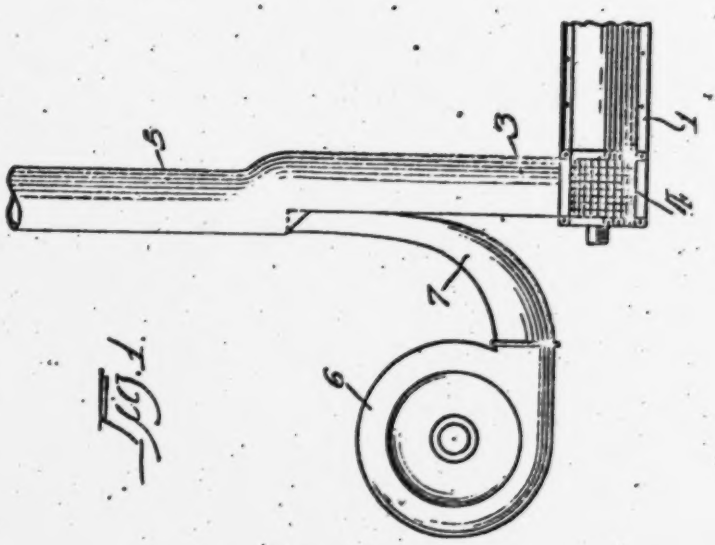


Fig. 1.

Inventor:
Charles Harazin,
By Wm. F. Freudenreich,
Attorney.

Patented Nov. 1, 1932 1,885,437

DEFENDANT'S EXHIBIT 24

UNITED STATES PATENT OFFICE

CHARLES HARAZIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO G. R. MEYERCORD, OF CHICAGO, ILLINOIS

COTTON ELEVATOR

Application filed May 11, 1931. Serial No. 536,324.

Machines have been devised to harvest cotton automatically, the cotton being collected from the plants as the machines pass across the field. The cotton thus gathered must be carried away from the gathering point into a receptacle that may be located at a considerable distance from such point. About the simplest way of carrying away the cotton is to cause it to be drawn by suction through a conduit extending away from a trough or other container into which the cotton is initially delivered from the picking elements. Considerable volumes of air are required for this purpose and, therefore, it has been proposed to place the inlet conduit of a blower in position to take up the cotton with the incoming air; the cotton passing through the blower and being discharged through an outlet conduit which delivers it to the storage point. However, in passing through the blower there is more or less tearing of the fiber of the cotton and crushing of the cotton seed. While there is more or less tearing of the fiber at all times, when the cotton is handled in this way, it becomes a serious matter where the cotton is wet. The object of the present invention is to make it possible to convey the cotton pneumatically in a simple and efficient manner without injury to the fiber or to the seed.

In carrying out my invention, I cause the cotton to take a path that carries it through a conduit without passing through the blower; the blower simply forcing air through the conduit in the direction of the outlet from the conduit at a point spaced at some distance inwardly from the inlet end of the conduit. The air forced through the conduit in this way lowers the pressure within the inlet end, so that outside air, and with it the cotton, is drawn in until it enters the stream of air by which the suction is induced and is then carried along with such stream to the discharge point.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is an elevation of so much of my improved pneumatic cotton handling apparatus as is necessary to explain the construction and principle thereof; and Fig. 2 is a view similar to Fig. 1, parts being in section.

Referring to the drawing, 1 represents a trough, closed at one end and open at the top at said end. This trough, in a cotton harvesting machine, will be placed in the proper position to receive the cotton as it is doffed by the picker elements. Within the trough is a suitable conveyor 2 that carries the cotton along the trough toward the closed end. Extending across the open top of the trough, at said closed end, is a conduit 3 of large cross sectional area. If desired, there may be an opening in the side of the trough just below the conduit, this opening being spanned by a suitable screen 4. At some distance above the trough the conduit is stepped laterally, preferably a distance equal to about half the diameter of the conduit. Therefore, the lower end of the upper section 5 of the conduit may be said to overhang or project beyond one side of the lower section. In accordance with my invention, I force air upwardly through this overhanging portion of the conduit. This may be conveniently accomplished by employing a suitable blower 6 whose discharge conduit or pipe 7 extends upwardly beside the lower section of the conveyor conduit and opens upwardly into the overhang. The volume and pressure of the air delivered by the blower being great enough, the cotton will be drawn up until it enters the stream from the blower, whereupon it will be forcibly impelled along the conduit. The outlet or discharge pipe from the blower preferably decreases in cross section area toward its outlet end so as to increase the velocity of the air before it is finally delivered into the conduit.

It will be thus seen that the cotton is picked up and carried along the conduit through the action of air currents alone and without being subjected to blows such as would be encountered in passing through the blower; and, consequently, there will be no damage to the

fiber or to the seed. It will also be seen that, if the blower is kept running, the cotton will be removed from the trough as fast as it is delivered by the picking mechanism, so that the cotton will not be given an opportunity to become solidly packed in the trough with resulting injury to the fiber and seed and clogging of the pneumatic conveyor. Not only is the cotton effectively handled by my improved pneumatic apparatus but, in the case of wet cotton, an important drying action takes place, due to the flow of air past and through the loose masses of fiber in transit. One of the purposes of my invention, therefore, may be said to dry wet cotton by means of air which carries it from one point to another.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. In a cotton handling apparatus, a container for cotton, a conduit of large cross sectional area rising from and stepped laterally at some distance above the container, a blower, and a discharge pipe leading from the blower upwardly into the overhanging portion of the conduit at such step.

2. In a cotton handling apparatus, a container for cotton, a conduit of large cross sectional area rising from and stepped laterally at some distance above the container, a blower, and a discharge pipe leading from the blower upwardly into the overhanging portion of the conduit at such step, said discharge pipe decreasing in cross sectional area as the distance from the blower increases.

3. In a cotton handling apparatus, a container for cotton, a conduit of large cross sectional area rising from and stepped laterally a distance about equal to one-half of its diameter at a point above the container, a blower, and a discharge pipe extending from the blower beside the lower part of the conduit and opening into the bottom of the overhanging portion of the conduit.

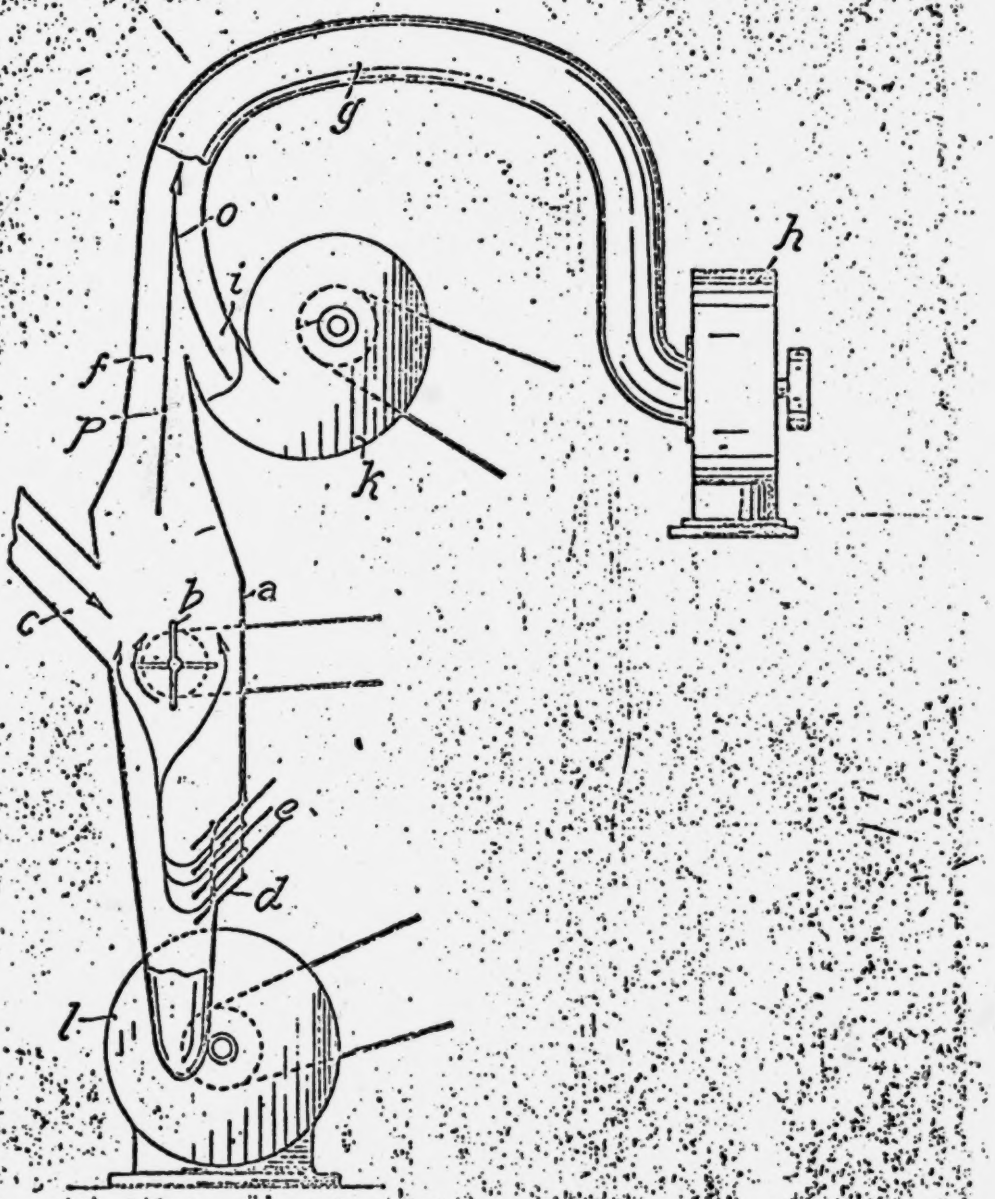
4. In a machine of the character described, a trough, a conveyor for moving cotton along the trough to one end thereof, a conduit open at the bottom extending across the top of and rising from said end of the trough, said conduit being stepped laterally at a point above the trough, a blower, and a discharge pipe extending from the blower along the lower part of the conduit and opening upwardly into the bottom of the overhanging part of the conduit.

In testimony whereof, I sign this specification.

CHARLES HARAZIN.

APPENDIX H

Zu der Patentschrift 453 353
Kl. 1a Gr. 28



DEFENDANTS' EXHIBIT 39

[Translation]

GERMAN REICH

(Seal) Released

December 5, 1927

REICH PATENT OFFICE
PATENT DESCRIPTION

#453 358

Class 1a Group 28

G65375 VI/ia

Date of publication of grant of patent: November 17, 1927.

Certified Engineer Kurt Gerson, Berlin

Equipment for the separation of components having varied specific weights and varied sizes in a mixed composition material through use of an airstream.

Patented in the German Reich from September 25, 1925 on.

The invention deals with equipment used for the separation of mixed composition material components into two parts having different specific weights through use of a divider shaft through which an airstream is blowing from the bottom to the top.

Equipment corresponding to the invention differentiates itself from known apparatus of this type through an arrangement whereby pressurized air obtained from a fan or other means is blown into the tube connecting to the upper discharge opening of the divider shaft from the side either immediately or a short distance above the upper end of the shaft. Air is sucked up through the divider shaft by the means of an injector effect created by the air being blown into the discharge tube; the air then continues on to push the materials having lighter specific weights which have been separated out and are passing into the discharge tube on through the connecting tube.

By so constructing the equipment, further movement of that portion of the material having lighter specific weight through the connecting tube can be guaranteed, in that this further movement is obtained by means of air under pressure at the same time that the advantage of suction separation of the mixed composition material in the divider shaft is obtained.

Equipment such as this invention is particularly suited to the separation of processed garbage into parts because garbage is a mixed composition material made up of paper, cardboard, rags, cloth remnants, food which has been discarded and other cellulose wastes in addition to cinders and other mineral components.

The sketch shows one example of how equipment could be constructed to conform with the invention.

The sketch shows a vertical shaft, marked "a", which may be of greater or lesser height depending on the requirements in the upper portion of which is an arrangement, "b", which could, for example, be equipped with paddles, the purpose of which arrangement would be to loosen up materials entering the shaft; this arrangement could be driven by a belt or in some other manner. At about the same height as this device is a supply channel which could be constructed in any desired manner through which channel, "c", the mixed materials could be introduced. Beneath the device for loosening up the material—device b—and on the side of the divider shaft "a" is a louver, "e", made up of a number of flaps, "d", which opens in such a manner that the flaps, "d", are directed in a downward angle into the shaft, "a". The size of the opening in the side wall through the louver, "e", can be regulated by opening the flaps, "d", as needed.

The upper end of the shaft "a", is moderately funnel-shaped, and at its discharge opening, "f", connects tightly with a tube, "g", which leads to a device, "h", which may be constructed in any known manner for the purpose of reducing the material to smaller particles; such a device

may be, for example, a cross-hammer mill. The discharge tube "i" of the fan "k" or other producer of pressurized air which producer could also be driven by a belt enters shaft "a" in the sketch immediately above the upper discharge "f" of the shaft "a". The lower end of the shaft "a" connects immediately with the intake of a mill or other device for reducing the size of the material; this device, "l", can also be driven by a belt.

In working with a piece of equipment conforming to that described the mixed composition material, such as processed garbage, is introduced into shaft "a" through supply channel "c", and is loosened up shortly after introduction by the loosening device, "b". The airstream produced by the fan, "k", and moving in the direction of the arrow, "o", pulls air from shaft "a" by injection in the direction of arrow "p", which then causes a flow of air through the adjustable louver opening "e" in the side of shaft "a" into shaft "a". A current of air thus flows through shaft "a", pulling components having lighter specific weights such as paper scraps, cloth scraps, rags, light-weight food scraps and so on along and carry them through the upper discharge point "f" of shaft "a" into tube "g", through which they are forced by the air coming from fan "k" into the closely attached reducing device "h". Here the lighter components of the mixed composition material, being made up almost entirely of materials containing cellulose, are torn and transformed into a matted cellulose raw material which could be further transformed into such things as paper or cardboard, distilled, or used in any other manner desired.

Heavier specific weight materials in shaft "a" which are not pulled along by the air current fall down through shaft "a"; here, the flaps "d" of the louver "e" prevent, by their inward-downward orientation, the exit of materials out through the louver "e" as they fall through shaft "a".

Components having heavier specific weights fall out of shaft "a" into the intake of mill "l" or other size-reducing apparatus in which they are ground to powder or dust comprised partly of mineral and partly of cellulose content

materials. Instead of having the specifically heavier components fall into a mill or other size-reducing apparatus, they could instead fall or be introduced directly into a slag oven or dry distillation apparatus for reduction to building materials.

PATENT CLAIMS

Equipment for separation of material made up of mixed components having various specific weights and sizes into two portions characterized by different specific weights through means of a separating shaft in which a current of air courses from the bottom to the top. Characterized by the following: a fan or other pressurized air generator (k) blows air from the side into a tube (g) at or immediately above the upper end of a divider shaft (a) at its upper discharge opening (f) through which air in the divider shaft (a) is sucked by an injector effect, which air then pushes components having lighter specific weights on through the upper discharge opening and the connecting tube.

Attached one page of sketchings

Berlin, printed in the Reich's Printing Office

CERTIFICATION OF TRANSLATION

March 2, 1970

This is to certify that the foregoing translation from German into English is to the best of my knowledge a true and complete rendition of the original document.

/s/ Hellmuth R. von Schwarzbek
Hellmuth R. von Schwarzbek

Translator Assoc.
Overland Park, Kansas 66207

Executed in my presence this 2nd day of March, 1970.

/s/ Louisa E. Baxa
Notary Public
Notary Public, State of Missouri
My Commission Expires
August 7, 1973